STRATEGY RESEARCH PROJECT

KNOWLEDGE WARRIOR FOR THE 21ST CENTURY
CATALYSTS FOR CULTURAL CHANGE

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May 11, 2000

Knowledge Warriors for the 21st Century

Catalysts for Cultural Change

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ABSTRACT

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TITLE: Knowledge Warriors for the 21st Century

FORMAT: Strategy/Student Research Project

DATE: 11 May 2000 **PAGES:** 75 **CLASSIFICATION:** Unclassified

The Knowledge Warrior (KW) concept is based upon sound Knowledge Management (KM) practices. Our proposed KW would bridge the gap that currently exists between information providers and military decision-makers. We believe KWs will become an ever-growing aspect of military operations and that KM will ultimately become the key skill of its practitioners. Our concept of KW sees the quest for knowledge as a continuous process whereby information is analyzed, synthesized and applied as a force multiplier. It transcends the boundaries of intelligence, operations, strategy, and communications. The KW will afford his commander a unique lens through which to view battlefield conditions and situations, as well as probe the future.

People are the linchpins of the KW program. We recommend that the services undertake efforts to recruit individuals with the aptitude and talent required to function in the KW capacity. Our KW concept represents a disruptive technology in many respects. However, we believe that this knowledge-based discipline will serve as a catalyst for our armed forces' transformation in the new millenium.

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Joint Vision 2010 (JV 2010) and service doctrines currently under development all tout the concept of Information Superiority and Knowledge Superiority as critical service core competencies for Joint warfighting in the future. In addition, the Revolution in Military Affairs (RMA) and the Revolution in Business Affairs (RBA) are both driving the services to transform their structures and warfighting doctrines from an Industrial Age model to one embodied in today's successful Information Age corporations. To survive and thrive in the networked world, successful Information Age businesses have adopted proactive and innovative resource planning systems and embraced Knowledge Management as a key concept to help them reach and sustain their competitive advantages. Due to structural and cultural impediments, it will be extremely difficult for the services to make a complete transformation from the Industrial Age to the Information Age organization model. A bridge element will be required, and the military's adaptation of the principles of Knowledge Management will play a vital role in this process. The services are already applying salient aspects of the RBA to their warfighting processes. Knowledge Management, the application of knowledge at all levels of warfare, enables the military to attain and maintain Information Superiority across the Spectrum of Conflict. Over time, we believe Knowledge Management (KM) and Network Centric Warfare (NCW) will become an ever-growing aspect of military operations, and KM will ultimately become the key skill of its practitioners. Accordingly, a Joint program will be required to guide the services in developing the "Knowledge Warriors" needed to meet the diverse national security challenges of the 21st century.

Our concept of KM applied in support of NCW sees it as a continuous process whereby information is synthesized and applied as a force multiplier. It transcends the boundaries of intelligence, operations, strategy and communications. To function in an ever deepening and more chaotic "sea of information," the Knowledge Warrior will require unique skill sets and attributes, to include a sense of entrepreneurship and self-investment. Accordingly, our Knowledge Warrior (KW) of the 21st Century will be a military officer conditioned in the art of information "arbitrage" and will serve as a living bridge between the plethora of information providers and his commander. However, the KW is not a substitute for the commander's staff, nor is he inserted vertically into the chain of command. Rather, his training, decision-making acumen, and experience afford his commander a unique lens through which to view battlefield conditions and situations, as well as probe the future.

The services are each taking different approaches for KM programs to face the JV 2010 Information Superiority challenge, in both the technical and personnel development arenas, but people are the real linchpins of this program. The services must undertake, early-on, efforts to identify and recruit individuals with the aptitude and talent required to function in the KW capacity compete with the corporate sector for these highly prized individuals. While the existing and planned service Information Technology (IT) personnel programs are establishing a baseline from which to build KW development, we think that a Joint standard is required to provide greater coherence and direction to service programs detailed in the following action agenda:

- Recommend that the Knowledge Warrior (KW) concept should be explored more in-depth by the joint community, under the auspices of the National Defense University in Washington, DC. NDU should undertake the academic setup, faculty monitoring, our proposed KW "virtual university" and orchestrating the joint portion of the KW education track. NDU

should also develop and refine a customized KW Assessment Toolkit for screening and evaluating KW candidates.

- Recommend the establishment of a JCS oversight process to immediately interact with National Defense University and the military services in regards to joint KW training standards, programs, and career development.

- Recommend the establishment of a joint KM capability at Joint Forces Command (JFC). Recommend that JFC should explore methods of joint operational employment of the KW concept. JFC would provide leadership for DoD-wide KM Programs, soliciting input from all of the respective joint warfighting CINCs. JFC would ultimately be responsible for determining how all DoD KW assets are organized, trained and equipped for joint commands and operations.

- Under Title 10, recommend that the military services need to engage in their own respective studies of the KW concept. However, we also recommend the services take steps to establish and man KM billets at the major fighting formations (CJTF-eligible commands). All of the services need to coordinate directly on all KM initiatives currently being reviewed by JFC. This coordination process is especially needed in regards to the manning, training, and ongoing development programs of joint KWs.

- Recommend that the KM concept be refined and exercised at the earliest opportunity within a major, joint operational wargame, (such as the U.S. Navy's "Global" wargame) and/or at the next Joint Forces Experiment (JEFX) venue.

In summary, KWs will usher in an era of cultural change in our military and will serve as catalysts for the armed forces' transformation in the new millennium. Our concept of KM and the development of a KW cadre represent a disruptive technology in many respects. The next Quadrennial Defense Review (QDR) is an opportune time to implement models, options, and an investment strategy for the services to follow in recruiting, training and retaining KWs. Senior leadership "buy-in" and advocacy is vital to the success of any KW initiative. A concerted, Joint-level effort will be crucial to ensure success.

INTRODUCTION

Framing the Problem

> "On the afternoon of May 7, a CIA officer tried desperately to contact intelligence officials in Europe to alert them to the fact that the Yugoslavian military facility they had targeted was, in fact, located one block away from where NATO pilots were about to drop bombs. By the time his concerns could be registered, planes taking part in NATO's Operation Allied Force already were flying toward the target. When the smoke cleared the next morning, NATO awoke to the harsh reality that it had just bombed the Chinese embassy and killed three people. In his official explanation of the factors that contributed to the deadly mistake, CIA director George Tenet described a "severely flawed" target identification process made worse by the use of outdated maps and databases filled with erroneous information."[1]

A Failure of Information

This singular event from the Kosovo conflict poignantly illustrates the pitfalls for the military in the Information Age – too much information and an inadequate means to capture and transfer knowledge. Even more telling are these comments by Admiral James O. Ellis, USN, the commander of Allied Forces Southern Europe and the commander of NATO forces in Joint Task Force NOBLE ANVIL during Operation ALLIED FORCE:

> "Information technology is great but it needs controls. Information saturation is additive to the "Fog of War." The demand for [accurate] info will always exceed the capability to provide it but how much is enough? You can have too much staff coordination...and for issues that don't require it...Uncontrolled, it will control you and your staffs...and lengthen your decision-cycle times."[2]

So how did we come to this pass? Why is technology driving us instead of vice versa? The Kosovo conflict was a different kind of war but has the nature of war been changed by technology? An increase in global deployments by a downsized military and a decreased DoD budget have created a gap in force deployment and warfighting capabilities. Technology supposedly will close the gap. However, an unintended consequence of technology has been the proliferation of information, such as that which contributed to the inadvertent bombing of the Chinese Embassy in Belgrade. Therefore, the underlying foundation for the assumption that technology will save us is *knowledge* of both friendly data and adversary intentions, movements

and force status, can and must be extracted from the information glut.[3] The growing recognition of the need for information was first noted by Dr. Andrew W. Marshall, Director of Net Assessment, in his prescient vision of a Revolution in Military Affairs (RMA). Marshall's original concept of the RMA became later embodied in the "System of Systems" mantra of Admiral William A. Owens, USN, the former Vice Chairman of the Joint Chiefs of Staff.[4] This technological vision has more recently evolved into the current DoD concept of "Network-Centric Warfare" which is an attempt to capture the essence of warfare in the Information Age.[5]

The increased demands placed on the military by the Information Age and the RMA will require a new mindset, one that welcomes and embraces change. One of the key changes in DoD over the past several years has been in the Revolution in Business Affairs (RBA), which targets modern, cutting edge business practice for adaptation by the military services. While the RBA has been implemented in DoD primarily to streamline and reform the acquisition process, we think that there are some innovative ways it can be applied in an operational context to enhance warfighting. In order to adapt to changes in their competitive environment, businesses have been forced to innovate. One of the key innovations has been in the recognition that intellectual capital - knowledge - was a fungible commodity. The resulting innovation has been the emergence of the formal concept of Knowledge Management (KM).

Knowledge and Cultural Change

Today, the key measure of wealth is how well a country or company amasses, shares and harvests knowledge. Knowledge, in all its forms, is now humankind's most important asset.[6] KM, as the link between technology and people, offers the potential to significantly leverage the value of IT investments. This, in turn, becomes the basis for a cultural change in the way we think about the business of National Security. The concept of KM as applied in our vision will

facilitate the [r]evolution of doctrine and organizational behavior so that all work synergistically.[7] For the military, this will require a cultural change to recognize the value of knowledge, and the appreciation of its practicioners. Every new RMA has produced a new elite. This aspect of the cultural change will be the most difficult for military professionals to assimilate. We offer the KW concept as a temporary and transitional concept for immediate insertion into the military culture as the bridge element to catalyze the military's transformation between the Industrial and Information Age. Once the catalytic action is complete, the KW may no longer be required, as by then, *each* military member will be regarded as a "Knowledge Warrior." But to do so, we must start now. If we delay, our people, our intellectual capital, will decide that they want to compete on a different team.[8] Which leads to our thesis questions: "How will the services respond to the phenomena of warfare in the Information Age? How will they implement personnel programs for the development of the military counterparts to the business world's Knowledge Managers (*i.e.*, Knowledge Warriors) in order to achieve Joint Vision 2010's (JV 2010) vision of Information Superiority?" To do so successfully, we strongly believe that the services must develop an investment strategy and initiate programs to develop and merge the technical acumen, operational experience, and KM principles in the mid-grade and senior levels. How to recruit, train, nurture, and retain these individuals are key topics to be discussed.

Paper Organization and Research Parameters

The paper will attempt to answer these questions and prove how Knowledge Warriors (KW) can indeed be catalysts for cultural change. In the first chapter, we will define our concept of Knowledge Management and the demands for the military to transform itself in order to succeed in the Information Age. This will be supported by case studies outlining recent

corporate experiences in transformation, which hold some important lessons for the military. With the framework set, the second chapter will survey the current state and scope of service KM and IT training programs. This survey will establish a baseline for the various service investment strategies and explore existing models and innovative options for developing and maintaining a KW cadre. Chapter Three will examine the desired skill sets and attributes of the ideal KW. Chapter Four will explore avenues and techniques that can be followed to determine who the best candidates are by screening current service members and future candidates. Finally, the paper will conclude with an analysis of the various options and recommendations for an action agenda to accomplish the transformation.

In order to focus the research, the paper will concentrate on officer programs and the mid-level managerial aspects of the KW challenge. It is our view that the enlisted community holds a lot of promise for incorporating aspects of this KW initiative. However, it represents too diverse and broad a topic to adequately discuss and analyze all aspects of the various service enlisted IT programs here. While our paper will probe future military uses of information, it will refrain from any discussion of Information Operations or Information Warfare. Similarly, it will refrain from any detailed discussion and avoid recommendations of specific technology or systems. The paper will examine some options that are not purely military or service related, but will leave those topics as leads for future researchers to follow by posing unanswered questions for future research.

CHAPTER ONE

KM and the Information Age Challenge

> Providing the right information to decisionmakers at the right time is the science of knowledge. Recognizing what information is actually important is the art."[9]

Chapter Overview

In this chapter, we will seek to define KM in the military context, KM as an aspect of the RBA, the challenges of JV2010, and Network Centric Warfare. Next will follow a comparison of the Industrial and Information Age models and analysis of the potential difficulty facing the military during the transformation process. Two case studies, of IBM and Cisco Systems, will be cited as examples with lessons for the military in this undertaking. Finally, a discussion of the Knowledge Warrior (KW) as a disruptive technology will close the chapter.

Two Aspects of KM

Studies on the subject of KM in the business world are divided between two streams of thought -- one examines knowledge as the management of codified information; the other stresses the personalization, wherein knowledge is transferred by intensive human interaction. Which school is correct? Or do they both capture some element of the problem? Most writers on KM in the business context that one strategically pursue one path or the other, but not both (at least not in equal measure). The choice is situationally dependent upon the particular business one is engaged in (*e.g.*, the large-scale production of standardized, mature products vs. a reliance on tacit knowledge for customized problem solving). In our view, this strategy avoids the critical question because it fails the common-sense test, and will ultimately collapse or be eclipsed by a new theory. However, "Knowledge Management" has been around for a long time,

whether it has been properly called that or not. It will exist in a purer form when the latest "management fad" has passed from the scene. What, then *is* KM?

KM Defined in the Military Context

KM, in our definition, is the application of actionable information to strategic and operational decision making. However, we need to prioritize problems and separate those that are solvable with data and information management techniques (like simple mathematical equations) from those that require something deeper. We do not think its purest form is one of the "either-or" proposition which some academics espouse, nor is knowledge, *per se*, a commodity that can be applied to every situation in varying degrees much like antibiotics are applied to cure infections. Rather, to apply knowledge is more like the difference between 2-D and 3-D, except to do so requires that one almost think and decide in 5-D or even 6-D.[1] This establishes the level of fidelity demanded for solutions to problems that require the real application of knowledge. It is the "art" vs. the "science."

KM as an Extension of the RBA

In a wider sense, the application of KM to the art of military decision-making is an extension of the RBA to a warfighting application. We believe this is an achievable innovation using current service programs and operational initiatives. Accordingly, we now build upon our definition of KM by adding an interpretation of what it means when applied in the Joint operational context. KM, in our now expanded definition, is a continuous process whereby information is synthesized and applied as a force multiplier. In this interpretation, it transcends

[1] This concept of decision-making is drawn from Thomas L. Friedman's The Lexus and the Olive Tree, whereby you add time as a fourth dimension to the three dimensions of space, along with intuition (Fifth Sense or what Clausewitz called the battlefield *coup d'oeil*), and a sense of the future and past social imperatives and implications of any strategic decision.

the boundaries of intelligence, operations, strategy, and communications in its scope. We feel strongly that this concept of KM will enable the military to attain and maintain Information Superiority across the Spectrum of Conflict - strategic, operational and tactical." In graphical terms, we think our concept of KM, the realm of the KW, would look something like the following illustration in Figure 1 below:

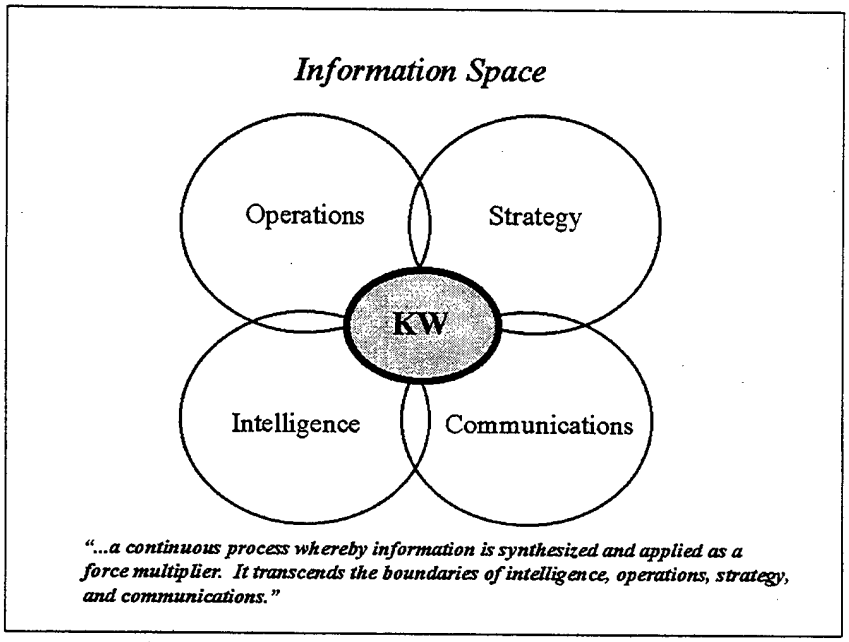

Figure 1-1. The Knowledge Warrior (KW) Concept Illustrated

Is KM simply the latest management fad? In April 1999, the Gartner Group commissioned a survey of over 800 companies in North America and Europe to determine precisely that. The Gartner Group found that the leading driver for KM was the need to improve knowledge sharing. KM was seen as a means to replicate best practices, avoid duplication of effort, increase synergy, accelerate the rate of innovation, and control or reduce cost. While the survey revealed much uncertainty over the true definition of KM, a significant finding was that KM was considered a competitive tool, and not just a cost-control technique focused on organizational efficiency. Another finding inferred from the study was the requirement for strong leadership and vision in implementing a KM strategy. And when the question arose

whether KM has staying power as a managerial concept, respondents in the survey indicated that the driving requirement for managing intellectual assets and capital was strong and would continue well into this century.[10] Accordingly, we think that there may be great power in adopting our operationally oriented KM proposal, and for the services to develop KWs.

In the military, speed is a valued asset. However, increases in volume and speed of information have and will not necessarily be accompanied by an increase in the decision-making capacity of human beings. Indeed, it is likely that we will only see a marginal improvement in the speed and quality of decisions, even those which could be aided by machines.[11] This is the yin and yang aspect of information in modern military operations, which exacerbates the effects of fog and friction despite the "promise" of new technology. It is also why knowledge has become such a precious resource today. Therefore, KM and the rationale for advocating the development of the KW are critical to achieving the vision of Information Superiority envisioned by Joint Vision 2010 (JV2010).

The JV2010 Challenge

Since its promulgation in 1996, JV 2010 has become the seminal military planning document for the Information Age. In JV2010, former Chairman of the Joint Chiefs of Staff General John Shalikashvili laid down the gauntlet to the services to get in synch on their approaches to warfare in the Information Age. Since that time, service doctrines and operational concepts have been continually revised both to touch base with the social changes being wrought by technology as well as the need to keep pace with the latest changes in the information world. Information superiority is being cited as a critical corps competency by all the services. We are seeing a trend in the services to abandon fixed, written doctrine and an increasing reliance on fluid and flexible doctrine, accessible and changeable on line in response to changes in both the

strategic and tactical situations. Was this the intent of JV2010? JV2010 states clearly that information superiority is "...the capability to collect, process and disseminate an uninterrupted flow of information while exploiting or denying an adversary's ability to do the same."[12] More importantly, it is the flow and management of information and the rendering of it into actionable knowledge. JV2010 also states "...the unqualified importance of information will not change in 2010. What will differ is the speed and accuracy of prioritizing and transferring data brought about by advances in technology. While the friction and fog of war can never be eliminated, *new technology promises to mitigate their impact.*"[13]

JV2010's successor, JV2020 (still in draft form) highlights Information and Information Operations as key enablers in 2020, taken across the full range of operations. Information superiority provides increased information at all levels (knowledge sharing) and provides for an increase in choices for commanders. However, JV020 emphasizes more than technology and introduces the idea of "decision superiority." JV2020 also expands the JV 2010 concept of technological innovation to include innovation in all aspects of the joint force. We feel that our KW concept fits in neatly with the promised tenets of JV2020.[14]

The RMA - Network Centric Warfare

Pundits will argue over whether the RMA is a true revolution or not. Yet it cannot be disputed that it has changed the thought processes within DoD. The earliest thinking of the RMA has yielded to a clearer idea of future warfare embodied in JV2010's Network Centric Warfare (NCW) concept. In brief, NCW can be defined as:

> "...an information superiority-enabled concept of operations that generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization."[15]

In the Information Age, information is the product, the raw material and the fuel.[16] However, information requires a filter or way of looking at it. This goes deeper than just the ordering and transmission of information. A deeper (or higher) state of knowing means that one can act, in the military sense, faster and more effectively than an enemy, thus achieving victory quicker and at lower cost. So, too, is NCW a search for a higher state of knowing. It is not just a way to amass more information and/or more data; rather, it is about how one converts information and data into actionable knowledge.[17] Knowledge and KM will be critical for NCW.

The Industrial vs. Information Age Models

As we have discussed, the RMA and the RBA are both driving the military to transform its structures and warfighting doctrines from an Industrial Age model to one embodied in today's successful Information Age corporations. In order to understand the powerful forces in opposition in the models, Table 1-1, which compares management concepts, should prove useful:

Table 1-1. Industrial vs. Information Age Management Models[18]

Feature	Industrial Age Model	Information Age Model
Organizational Structure	Organization structured into a three-tier hierarchy: top management, middle management, and production workers	Network, flattened, few tiers/levels of management, near-direct communications between workers and the top-level
Functional	Fixed functions of line and staff, based upon type of expertise	Flexible in response to requirements
Strategic Orientation	Driven by production activities	Serving customer's needs vice manufacturing the product or service
Tasking	Tasks are carried out within functions and functions are designed to minimize required communications	Work is organized into projects and carried out by team members that are assigned to projects based upon their expertise necessary to accomplish the project goals

Cycle-time	Fiscal year planning and budgeting	Resource allocation decisions made in real-time
Worker-class separation	White-collar workers design the way work is to be carried out and blue-collar workers execute	All employees are treated as a uni-class of knowledge workers vs. the two-class system of white-/blue-collar workers
Information	Restricted flow based on "need-to-know"	All organization members have access to all information
Communications	Formal and paper-based	Swift, spontaneous and point-to-point
Supervision	Direct observation of workers	Indirect through result assessment information
Rewards	Pay based on position, responsibility, loyalty and seniority	Pay based on performance
Span-of-control	Managers have 6-10 subordinates	Variable and not limited by direct observation of workers
Team	Teams are formed more for "crisis management"	Teams are formed by leaders offering compensation packages to attract knowledge workers with needed expertise to achieve project objectives
Control	Inefficient and along line and staff functions	Control is efficient through extensive feedback information, and self interest reward systems that act to motivate workers to maintain high levels of performance
Conflict-resolution	Conflict oftentimes results in formal investigations and legal action being initiated	Conflict of the firm with customers, employees, shareholders and suppliers is expediently mediated with the use of third party mediation being the exception
Opportunity	Limited and based on position vice ability	Activity is oriented towards fast-changing global market opportunities vs. overcoming organizational inertia
Boundary	Fixed, inflexible	Organizational boundaries are organic, continuously expanding and contracting as various network relationships are added and subtracted from the "firm"

In assessing differences between the Industrial and Information Age models, the relative advantages of the Information Age model, *i.e.*, a flatter and more direct organization, mission orientation, a focus on products vice process, and increased speed in decision making, are apparent. The chief difference between the two is the concept of creating value, which is at the heart of competitive advantage.[19] The emphasis on value as a goal of the Information Age

organization is antithetical to that of the Industrial Age model, with its emphasis on planning and resource management. Today's military, while in the process of transformation to the Information Age, will still retain many of the encumbrances of the Industrial Age. These will include the rank structure, pay compensation, a seniority-driven tasking and rewards system, as well as the hierarchical, top-down command structure. Other holdovers will include the annual (fiscal-year) cycle for planning, unequal systems for assigning work and rewards, and lack of an emphasis or concept of value translatable into military terms from that of the commercial world.

The Challenges of Transformation

A nation's military becomes a reflection of the society from which it is drawn. Today's military, which came of age during the industrial eras of World Wars I and II, retains much of that legacy in its current force and organizational structures. However, our society is undergoing profound change amid the information revolution. As a result, security requirements are changing, as are society's expectations of the military in defense of the nation. As a result, the military's "enterprise" is also changing.

The forms we adapt from the civilian influences on the military will also change.[20] The commercial sector is leading the way in adopting Information Age concepts and technologies to adapt to a changing world. The business world has been driven by competition, lowered barriers to entry, and a reduction in the competitive advantage previously enjoyed by organizations established on the Industrial Age model. The advantages of the incumbents have been eroded by changes in cost structures, methods of production and distribution, and marketplace characteristics resulting from Information Age concepts and technology.[21] Industrial Age military models and means of making war will yield to Information Age models and means. But if we change the force model, we must also change the management model - otherwise, we will build a force both unsuitable and unwieldy for future warfare. Therefore, warfighting concepts

based on Information Age models and knowledge must be managed accordingly. However, there will be impediments to this metamorphosis, due to the inertia inherent to the Industrial Age model. The key, then, is to unite the social and military perspectives on information technology into an understanding of how the military enterprise is to evolve.[22]

Despite the pitfalls, there is hope that the military can master the transformation to an Information Age model, and will be able to alleviate the continued disruptions in the functioning of the model it adapts caused by the legacy of the Industrial Age. In the commercial world, there are examples of corporations that mirror the military's size and complexity that have successfully adapted to "less- than-perfect" transformations. The IBM case study holds many lessons for the military as we struggle with our own transformation:

> "From its earliest beginnings until the 1980s, IBM had enjoyed the position of being the dominant computer and software manufacturer in the world. Until 1990, IBM remained the largest Information Technology (IT) company, with the largest market shares in the mainframe, minicomputer and microcomputer markets. IBM had the highest revenues, profits and market value in the industry. However, by 1998, a new set of players driven by much lower revenues took advantage of the network era and challenged IBM's market value position. Microsoft was first, followed by Intel and Cisco. The reasons for IBM's success were also the root causes of its downfall: sweeping vertical integration and huge scale, a committed and loyal work force (full employment was guaranteed) and a corporate culture that rewarded loyalty and longevity, much like today's military force. By the 1980s, however, IT began to change the playing field. Advances in semiconductor technology came so quickly that improvements in price and performance were expanding fourfold every three years. Moore's Law[23] and innovation became the driving forces, not planning or size of resources. The emergence of new IT and different customer needs altered the economic, technical and human requirements for competition."

Despite its size, the gap between IBM and its smaller competitors was narrowed significantly.

> "The complexity of the environment and speed of change made IBM much more difficult to manage. The highly centralized functional organization that had served the company well in the Industrial Age was failing. Resource allocation, overhead, staff size and slow decision making had become key challenges, the competition was more nimble and IBM's products were late to market and incompatible. IBM was not set up to solve customer problems nor was its culture focused on creating value for its customers. To survive in the Information Age, IBM had to change. To do so, IBM bought in new management and ideas. The new management embarked upon an ambitious program to transform the company. First, they established basic goals - to enhance customer relationships, improve product competitiveness, and strengthen structural efficiency - without changing the workforce and commitment to full employment (*i.e.*, no "downsizing"). IBM began by streamlining their product line, reducing excess capacity and realigning human resources. Next, they enacted a sweeping reorganization of the entire company to emphasize markets, and de-emphasize hardware, to improve coordination, fix responsibility for results yet decentralize authority. IBM was able to achieve personnel reductions through attrition. IBM renewed their emphasis on quality and began to focus planning and strategy on the markets, vice inwardly. To increase the speed of decision making, IBM emphasized decentralization, empowered regional executives and managers, and fostered scenario vice numbers-based planning for resource allocation decisions. In changing its culture, IBM also

became more receptive to outside ideas and partnerships and abandoned a long standing "not invented here" mental block in its corporate thinking. By avoiding large-scale downsizing, IBM was able to retain its key asset - people - and considered the greater worker productivity and commitment as a key competitive advantage, despite higher costs. IBM emerged from this restructuring recording higher profits, renewed market value, and remained the broadest based computer company in the world. But now, size and scope became key competitive advantages vice impediments. IBM's transformation was a dynamic and ever-changing process, one that never would be complete. However, IBM's top management felt that they had instilled the discipline, stress on innovation and fast response now required to remain the undisputed leader."[24]

But did it last? The IBM of the 1980s was very similar in size and scope to today's military forces. At this point in the case, therefore IBM very much resembles the state of the US military today. What happened next to IBM is very important to understand:

"At this point IBM enjoyed a brief resurgence and return to profitability but it was not to last. In the end, the company's inherent complexity and entrenched ways of doing business were the causes of its downfall in the 90s. The evolved bureaucracy became a hindrance to the company's decision-making. Senior management decisions were made by committee, and a "non-concur" from any one member could overrule general agreement on a course of action. Executives had large staffs but little direct involvement. They presided over presentations prepared at length and presented by staff members, rarely presenting anything personally. Numerous "pre-meetings" in which staffs would work to align positions and eliminate surprises preceded senior management meetings. Staff members attended executive meetings in swarms, hanging out in hallways or seated behind their executives in the meeting room armed with volumes of backup material. Use of overheads was extensive, most executive offices had built-in projectors. In response to rapidly falling revenues due to product non-acceptance, the company was forced into mass involuntary layoffs and a round of cost slashing and waste elimination. However, it took a change in senior leadership and direction from the top, adaptation of new products and a customer service orientation, in effect, a cultural change, that IBM was able to make the turnaround and complete another reorganization and the transformation from the Industrial, to the Information Age."[25]

What can we learn from IBM's experience? First, leadership is key - leaders must set the strategic goals of the organization yet allow for decentralized planning, execution and flattened management structures. Equally important is the leveraging of technology. Technology allows a company to move to a more efficient operation which can "sense and respond" vs. "make and sell." In a "sense and respond" operation, Information Age companies use IT to go beyond the bounds of their organizations to monitor their customers continuously, using knowledge to not only sense their needs, but also to anticipate their unrecognized needs and develop new capabilities to meet those needs. The "sense and respond" organization is continuously creating

new partnerships and alliances, new inter-organizational networking capabilities and new business processes.

The accelerated deployment of computer networks and the increase in bandwidth for transmitting data is at the heart of this transition from the traditional functional hierarchy of the Industrial Age to the IT-enabled network organizational structure of the Information Age. This combination of technological evolution and organizational learning, as demonstrated in the IBM case study, provide strategic opportunities.[26] Innovation in systems design and technology implementation is also an important aspect of managing the Information Age transformation. Companies have discovered that they must look at new methods and business processes to exploit the increased capability for collaboration and manage knowledge sharing.

At this juncture, it is useful to take up another case study, this time involving Cisco Systems' implementation of an innovative Enterprise Resource Planning (ERP) system. We highlight the Cisco case for two reasons. First, the services are starting to turn to large integrated planning and resource management systems very similar to an ERP. Cisco is the textbook example for how to do this successfully. Secondly, the Cisco case also demonstrates how a smaller competitor can use the same technology but in innovative ways to equal and ultimately surpass a larger opponent:

> "In 1994, Cisco Systems was facing a crisis in its IT support. Cisco had outgrown its legacy systems. The systems were functionally segregated, incompatible and subject to increasingly frequent failures. Cisco was in the midst of trying to grow from a company with revenues of $500 million to revenues worth $5 billion. To do so, it required a comprehensive and complex system to support its business processes. While there was some trepidation on the part of both the company's board and chief executives, the decision was made to put in place an ERP which would unite Cisco's business enterprise across both its functional areas and also with its customers. The comprehensive ERP system was implemented through detailed planning and the efforts of Cisco's most talented and capable employees and managers. While the implementation was not an immediate success, it grew over a relatively short period of time via modifications and an intense training program into an information management system which allowed Cisco to, not only achieve significant savings, but also grow and compete with its larger-resourced competitors on even terms.[27] Cisco succeeded because they made a real commitment to integrate customers, employees and suppliers into their system via the Internet. Information became Cisco's key asset and their success with the ERP can be measured in real dollar terms. For an initial $15 million dollar investment in 1995, Cisco was able to account for nearly $1 billion in cost savings and increased sales and productivity directly related to their ERP implementation by 2000. Today, Cisco is one of the largest

companies in the world in terms of market value, over $400 billion, with revenues over $50 billion. Much of that success can be ascribed to their decision to implement the ERP back in 1994."[28]

As this case makes clear, Cisco greatly exceeded its goal *by a factor of 10.* Not all of this success is directly attributable to the ERP implementation -- good products, market conditions, demand and timing also play large roles. However, Cisco could not have achieved this success without the ERP, thus demonstrating its enabling power by allowing Cisco to amass information and manage its corporate knowledge.

Technology is not the be-all and end-all of these stories. It took decision-empowered human beings, an innovative spirit, and the willingness to expend human capital at the right points to achieve both IBM's restructuring and facilitate Cisco's explosive growth. So, what lessons can the military learn from IBM and Cisco? First, the military is very much like a huge business corporation with large databases, capital resources, people and management processes. The military faces the same challenges today that IBM and Cisco did during the 1990s, but the goals and objectives in the military are different, and its reorganization, restructuring, and ERP-like implementation experiences will be much different from the business model-oriented successes rung up by IBM and Cisco. To adapt to changes in their competitive environments wrought by technology, IBM and Cisco developed and executed effective business and investment strategies that ultimately enhanced their profitability and market values. Unlike business, the military does not have to produce an annual profit statement and its market value is measured in the minds of US citizens and the degree of security they enjoy. On the other hand and like IBM (and Cisco), the military also has a culture that is unique. People are its greatest resource and harnessing and directing their talents is the key function of leadership. The military must develop an investment strategy that leverages people -- its intellectual capital -- as much as changes to organizational and resource allocation schemes. That's why encouraging and

nurturing innovation by empowering the most talented service members will be such a key ingredient to the military's successful transformation to the Information Age.

The Knowledge Warrior as a Disruptive Technology

The military is experiencing an internal struggle with the forces of change. First, we want to gain for ourselves the fruits of the information revolution when applying them to our traditional concept of military roles and missions. However, we are afraid that by "riding the [Information Age] tiger," we will have those traditional concepts overturned and replaced with a new kind of war and new kinds of warriors. The balancing act, then, is to embrace information technology without being undone by it.[29] And so the fear of innovation is borne out in the rise of a disruptive technology that challenges the underpinnings of the current dominant form. The Industrial Age model, based on the hierarchical command structure, sees its demise in the Information Age and its network.

The military is like an outmoded business enterprise ripe for model destruction. For the past 50 years, the military has focused on process improvement with very little structural change. Because the system is self-correcting and is concerned with bureaucratic survival in a zero sum game, the services have collectively and consciously chosen to follow courses of action and make decisions which lead to the adaptation of "sustaining" technologies, and maintenance of the status quo. This system worked very well during the Cold War era, when it was easy to conduct threat and risk assessments for decision making based on a monolithic threat (*i.e.*, the Soviet Union) and "mirror imaging" net assessment was *de rigeur*. The process of destroying the Industrial Age models has already begun within the military and services. Yet, the real disruptive technology that will sweep away the old hierarchical system has yet to emerge.

A disruptive technology is one that starts out innocuously, on a small scale. It brings to the marketplace a very different value proposition than had been previously available. Generally, the disruptive technology significantly under performs established products, at least in the short-term, but brings other things to the table that a few fringe customers value. Disruptive technologies are smaller, cheaper, simpler and, frequently, more convenient to use. Disruptive technologies have a hard time competing for resources and attention with sustaining, mainstream technologies from higher level decision makers. Disruptive technologies can not compete in established markets, but must instead look for niche or new markets for their products. From there, they build momentum as acceptance and rate of user conversion increases, until they eventually supplant the old established technology in the marketplace.[30] In the marketplace of ideas, we think the Knowledge Warrior proposal, an innovation in managing information and intellectual capital, is a potentially disruptive technology that has the power to change the operational behavior and strategy of tomorrow's forces.

Information and information-based processes are becoming the dominant value adding processes in both the commercial world and the military. Yet, the military has consistently failed to reward personnel for competence in these areas. The "Operator" designation is denied to personnel with these critical skills. However, we see a day when traditional operators will ultimately be marginalized, unless they possess information and KM skills. Information has become the true source of combat power.[31] Our Knowledge Warrior must be able to leverage the operational information and expertise of his unit and the service. As a Joint operations specialist, he must be adept at information arbitrage, of synthesizing data from many different dimensions at once, and then applying it in support of knowledge-based, Network Centric Warfare.[32] These are the new operators, the Knowledge Warriors for the 21st Century.[33]

CHAPTER TWO

Service Perspectives

"...learning faster than your competitors comes to be seen as the only sustainable competitive advantage in an environment of rapid innovation and change."

Arie de Geus[34]

Chapter Overview

During the course of our research, we have found that KM is a topic that is garnering more and more attention in both the service and Joint contexts. As we noted in Chapter 1, the Joint world has discovered the need to bend IT and IO to support decision-making (*e.g.*, JV2020's promise to emphasize "decision superiority"). Some service KM initiatives make noise in that direction, and the service concepts are changing even as this paper is being written. However, it is our opinion that most of these programs remain focused on the horizontal integration of IT in the form of enterprise systems, intranets and network communications technology. We feel that the power of the KW concept, to support decision-making, is an excellent complement to the current service efforts by operating in the *vertical* dimension, bringing knowledge to bear in support of decision-making. Alberts, Garstka, and Stein acknowledge at the end of the most recent version of Network Centric Warfare, that the impact on people and requirements for training and education still needed to be examined, and that people were the key elements in making these new warfighting concepts "work.[35] In the graphic below, we illustrate where we think the KW fits in with the current horizontal orientation of most service programs.

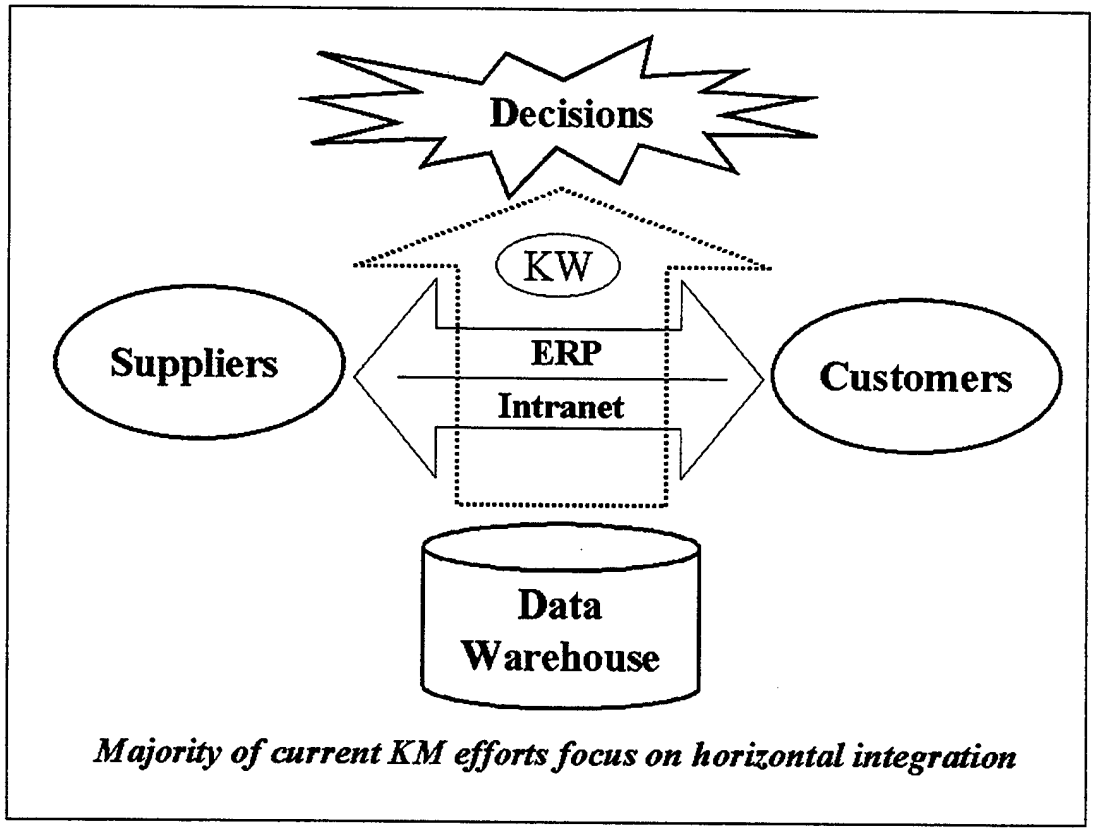

Figure 2-1. The KW provides a vertical component.[36]

Of all the services, the Navy has the most comprehensive and wide-ranging array of IT and KM-specific/related programs and initiatives in both the administrative and operational realms. Accordingly, we will use the Navy (and Marine Corps) as the benchmark for the other services as we attempt to survey the KM landscape within the military and where it stands today. What we intend in this section is not to critique any service's efforts, but rather to develop a baseline for the development of innovative options for linking organizational, operational, and training initiatives in a possible future joint program. This baseline review of service programs will look at each service's organizational KM concept, operational initiatives to which KM is either incorporated or could potentially play a key enabling role, and training resources which could be leveraged for developing KW candidates under our concept. Finally, Joint efforts toward KM will be examined.

NAVY/MARINE CORPS

Knowledge Management Concept

The Department of the Navy's Central Information Office (DoNCIO) is the lead element for the DoN[37] for KM initiatives and is in the process of building the "Knowledge Enterprise."[38] DoN has adapted the business world's view that organizations are increasingly knowledge-driven. They take in data and information and produce either a product or service, using their own and other's knowledge and information. DoNCIO recognizes that much of the knowledge in an organization is tacit, *i.e.*, embedded in the minds of employees (*e.g.*, past experience and internal learning create processes, insights, methodologies, know-how and understanding. Knowledge is considered the most basic of all Core Competencies; its management becomes a vital concern for the naval services.

Information Management (IM) and IT are essential but insufficient to achieve information superiority. KM, the link between technology and people, offers the potential to significantly leverage the value of naval service IT investments. KM initiatives are emerging at every level of the DoN. In developing programs for the shore support side of the Navy, DoNCIO is working to leverage data, information, and knowledge to achieve information and knowledge superiority. As a Knowledge-Centric organization, DoNCIO aims to leverage intellectual capital, improve decision-making, innovation, transfer "best practices," and maximize the value of the experience, expertise, and innovative ideas across the DoN. Key DoNCIO initiatives for knowledge sharing include the Navy/Marine Corps Intranet (N/MCI), the Commander-in-Chief Pacific Fleet (CINCPACFLT) Knowledge Homeport, Enterprise Portals/Enterprise Resource Planning Systems (ERP), and Marine Online.

In DoNCIO's world, a Knowledge-Centric organization is one that organizes virtually around its critical knowledge needs. Crucial to this function are the roles of both the command-level Knowledge Manager and the staff-level Chief Knowledge Officer (CKO), both of which require specific characteristics and special skill sets. Individual in these fields must have knowledge of and alignment with organization goals, objectives and business strategies. He/she must be technology-capable and a gifted communicator with an appetite for learning and information sharing, as well as strong skills for content extraction, synthesis, analysis, and integration. As KM is key to leveraging IT investment, it is also essential to identify leaders and focus management attention to realize KM's full potential. As of this writing, the recommendation has been made that the DoN formally designate a CKO and also a KM.

Service Doctrine/Operational Concept[39]

The Network Centric Operations (NCO) concept under development by the Navy Warfare Development Command (NWDC) is the Navy's approach and organizing principle for future naval forces. The underlying theme of the NCO concept is that fundamental changes in the value and use of information have dramatically improved the ability to produce an information and knowledge advantage over an adversary. Information and knowledge have always been crucial, but operational and organizational innovation, supported by emerging technology, now have the potential to produce orders of magnitude improvements in the ability to build superior knowledge and then exploit this superiority for decisive success in presence, crisis, and war.

The operational concepts that underpin NCO revolve around actionable knowledge and a shift from attrition to effects-based combat. The Navy will use four supporting concepts in carrying out NCO: Information and knowledge advantage, Assured Access, Speed of Effects,

and Forward Sea-Based Forces. While the latter three are important, the supporting concepts of information and knowledge advantage emphasize winning the early information battle by exploiting regional knowledge, sensor operations, and command philosophy. Under NCO, information and knowledge will become weapons. Common, comprehensive battlespace awareness by naval, joint, and combined warfighters and by interagency forces, enabled by an accelerating pace of information technology innovation and advances in sensor and weapon technology will become a necessity. Superior warfighter knowledge will enable combat success in the face of increasing complexity. In conflict and crisis, Naval forces must be able to achieve early success in the fight for information and knowledge advantage.

Information and knowledge advantage expand the doctrinal idea of information superiority to include current, often real-time, battle space information and a foundation of regional knowledge of the adversary. Armed with this knowledge, warfighters can unleash a potentially decisive, effects-based opening attack using overwhelming rates of change and precisely targeted attacks to effect all enemy reason, belief and physical domains. Effects-based operations, in conjunction with NCO, give the Naval services the ability to lock out enemy options and thereby lock-in success.

NCO focuses on the operational level of warfare, deriving power from the robust, rapid networking of well informed, geographically dispersed forces. While NCO couples technological innovations with new operational warfighting concepts, it remains based on enduring doctrine and the principles of warfare. The goals of NCO are not new -- they are the same ends sought by commanders since Sun Tzu, but the degree to which they are achieved and their impact on military operations is being redefined. Alone, either networking and information technology or effects-based operations will provide important benefits -- but it takes both to achieve the full power of the NCO concept. Together, they support both Navy power projection

and the Marine Corps concept of Operational Maneuver... from the Sea (OMFTS) to achieve decisive results ashore.

Finally, cultural change in thinking about information, command, and operations is needed if NCO is to succeed. In the new culture, organizations (civilian and military) that successfully exploit the power of information and emphasize sharing across the organization vice encumbering information with artificial restrictions disconnected from operating requirements will be the winners. These organizations recognize that information technology is an investment and not just an expense. The successful NCO organization will realize that people, not just technology, are the real keys to success in the new environment.

Marine Corps KM Initiatives

In addition to being a full-fledged partner in the N/MCI and the other DoNCIO initiatives cited above, the Marines are also weighing the decision to designate a service CKO and development of a Commandant's Intent directive for KM. Much as we do in this paper, the Marines view KM as an art, with IM as the science for applying IT to achieve command objectives. Strategically, the Marine Corps recognizes the value of the collective knowledge of their unique organization, the necessity to develop and sustain a culture that promotes knowledge sharing and collaboration, and the requirement to incorporate knowledge and KM into the every day routine for Marines both ashore and afloat worldwide. To that end, the Marine Corps is developing pilot initiatives involving both the operational forces (the FMFs) and the supporting establishment - Headquarters (HQMC) and the Marine Corps Systems Command (MARCORSYSCOM), post and station forces. Of all the services, the Marines probably do the best job of identifying training requirements for their key personnel billets (*i.e.*, Information Management Officers) and filling training quotas at both the Naval Postgraduate School and also

the USMC Command and Control Systems Course (CCSC) taught at Quantico. After training is completed, the Marines then ensure that these trained personnel are assigned to operational billets requiring their expertise.

Operational Initiatives

The Navy and Marines Corps are pursuing several initiatives in which KM plays a key enabling role. First, a Network Centric Innovation Center (NCIC) was established in 1999 under the auspices of CINCPACFLT. Located in San Diego, the NCIC was chartered to develop procedures and practices for NCW and the Information Technology-21st Century program (IT-21). The center in intended to be fleet oriented to discover innovative ways of employing IT-21 and KM principles to enhance warfighting by Carrier Battle Groups (CVBG) and Amphibious Ready Groups (ARG) which also include an embarked Marine Expeditionary Unit (MEU). The first groups to deploy, the USS JOHN C. STENNIS CVBG and the USS BON HOMME RICHARD ARG, are pursuing an initiative called the CVBG Collaboration and KM project. In addition to this initial operational endeavor, the Naval War College (NWC) is conducting its annual Global War Game (Global 2000) in Newport, RI, this summer.[40] Global 2000 will feature the NCO concept described above, which will include a key role for KM based along the lines of the concept outlined by this paper.

Training

The Navy owns and operates its own post-graduate school (NPS) separate from its war college, located in Monterey, CA. The NPS provides more than 40 programs of study, ranging from the traditional engineering and physical sciences, to the rapidly evolving Space Science and (more to our purposes) Information Technology (IT) programs. There is also a program run by

the Center for Executive Education concerned with the education of senior officers from all services and civilians on the opportunities and changing environment of the Information Age. The annual student population at the NPS is approximately 1400, with students coming from all service branches of the defense community, as well as the Coast Guard, the National Oceanic and Atmospheric Administration, and the services of more than 50 allied nations. Of these, over 300 are undergoing training in curricula related to IT programs. NPS also has a joint presence within its IT community which is the Institute for Joint Warfare Analysis (IJWA). The IJWA exists within the NPS for the promotion of joint research and instruction. Institute programs are oriented toward operational problem solving and providing support for operational commands and major DoD programs. The IJWA's research program is concentrated in areas that support Information Age warfare and features a blend of operations research, C4ISR, and weapon systems design and testing.

IT programs at the NPS are in the process of reorganization under a new concept called the Space, Information Warfare, and Command and (SIWCC). SIWCC is a core body of knowledge for five curricula under the sponsorship of CNO N6. These five are Information Systems Technology (IST), Computer Science (CS), Modeling, Virtual Environments and Simulation (MOVES), Space Systems Operations (SSO), and Information Warfare (IW). A sixth curriculum -- Joint Command and Control, Communications, Computers, and Intelligence (JC4I) Systems – is sponsored by the Joint Staff J6, with N6 as the Executive Agent.[41] We are chiefly interested in a new course of study, Information Systems Operations (ISO). ISO is under N6 sponsorship and aimed at Unrestricted Line Officers to increase the IT and management (IM) competency in those communities.

A cross-discipline professional curriculum, the ISO is designed to employ IT systems engineering as its foundation, with an emphasis on computer and telecommunications systems,

networked and distributed applications, database management, and decision support systems. In addition, the ISO curriculum will develop a core of "competency areas" of study crucial to the understanding and utilization of modern military systems. These include information operations, economics, decision support and management, the 21st Century international and national political/military content, the organizational aspects of joint warfare planning and operations, and a major engineering project undertaken by an interdisciplinary team for group integration. In the future, it is hope that IJWA will sponsor research projects originated in the ISO curriculum. We believe the ISO program, due to its targeting at the senior O-3/junior O-4 level, future interaction with the Joint world via the IJWA, and multi-disciplinary emphasis to include operational planning and Joint Professional Military Education (JPME), is ideal to leverage and expand for the professional education and training we envision for the KW.

ARMY

Knowledge Management Concept

The U.S. Army's KM conceptual framework is built around a vision published in late 1998 by the Department of the Army staff. The resulting product, "*Army Knowledge Online (AKO) Strategic Plan*" establishes the Army's shared vision for KM, to include its required goals and objectives; while identifying Army KM's roles and responsibilities; and enumerating the tasks required to accomplish these KM goals. Specifically, the *Army Knowledge Online (AKO) Strategic Plan*:

- Provides a framework to embed KM competencies in the people, processes, and technical designs of the Army institutional elements and operational forces
- Establishes the processes and infrastructure to share knowledge and collaborate across the spectrum of functional and organizational lines[42]

The Army KM vision and mission statement reflect the criteria for success in implementing the strategy.

- **Vision**—Transform the Army institutional elements and operating forces into an information-age, networked organization that leverages its intellectual capital to better organize, train, equip and maintain a strategic land combat Army Force.

- **Mission**—The mission of Army Knowledge Online is to institutionalize knowledge management into Army culture and processes to achieve a sustaining momentum that will carry it forward through the Army After Next. This will be accomplished through changes in organizational structure, facilities, people, processes, and technology.[43]

To help the Army realize its KM vision, goals and attendant objectives, as well as appropriate tasks, have been developed to provide the fundamental "stepping stones" upon which Army KM Programs are built. Objectives detail the basic elements required to achieve Army KM goals. Relevant tasks are then derived from these broad KM strategic objectives and offer a framework for the actions needed to achieve each goal. Six key goals comprise the Army's KM vision:

- **Goal 1**—Achieve cultural and business practice changes through leadership, guidance, education, and productive use of KM

- **Goal 2**—Develop a network-centric organizational structure that provides a central focus for AKO leadership and a decentralized focus for KM implementation

- **Goal 3**—Measurably improve business processes supporting the warfighter and Army readiness through AKO and KM

- **Goal 4**—Incorporate KM considerations into Army policy and strategic processes

- **Goal 5**—Achieve unimpeded but secure access to information

- **Goal 6**—Provide a robust, Army-wide Intranet capability for AKO to support the sharing of knowledge and collaboration across functional boundaries, including with other Services and DOD agencies[44]

The Army's main KM objectives, those basic elements necessary to achieve the six key goals, include the following short and long-term programs, plus key process improvements:

- **Objective 1**—Build necessary skills across the Army to apply KM processes and technology

- **Objective 2**—Integrate emerging KM methodologies with high cross-functional potential through the establishment of a central repository to capture and maintain initiative information and successful pilot projects

- **Objective 3**—Create a cross-functional collaborative environment for KM implementation that fosters the cultural changes necessary to conduct business electronically

- **Objective 4**—Acquire necessary resources to support implementation of Army KM initiatives and to identify, mentor, and learn from all Army organizations that experiment with or practice KM

- **Objective 5**—Empower process owners to implement performance-enhancing KM initiatives through pilot projects

- **Objective 6**—Develop, staff, and publish policy and procedures for the implementation of KM in the Army, and modify law, regulation and other policies that may impede appropriate implementation of KM principles

- **Objective 7**—Promote Army-wide KM technical standards, including information security, consistent with established Army and Department of Defense (DoD) standards

- **Objective 8**—Integrate KM practices into key Army processes across functional boundaries[45]

Army KM tasks seek to represent an integrated set of actions that describe how the Army's KM goals will be accomplished over the near-, mid-, and long-term planning horizons. In the near-term AKO will develop, promote, and implement knowledge-based initiatives. The mid-term tasks include cross-functional integration, funding/resourcing, information sharing, and benchmarking "Best Business Practices." Ultimately, the Army's long-term KM task is to facilitate the sharing of the Army's collective knowledge and to enhance cross-functional collaboration within daily operations. In doing so, the Army seeks to try and transform itself: the overall aim is to become a lighter combat force in the future, with more lethality, mobility, organizational agility, and responsiveness to the overall needs of its digitized combat forces.

By its very nature, the AKO is designed to operate as a virtual entity. As such, it is uniquely organized and contains two main components, an Executive Steering Committee (ESC) and affiliated Knowledge Centers (KCs). Neither component is intended to follow traditional hierarchical authority lines in their composition, nor in their relationship to the AKO and each other. Both the ESC and the KCs will be supported by elements of Headquarters Department of the Army (HQDA) agencies, which will serve as the AKO Functional Proponent and as the AKO Materiel Developer.

The Major Commands (MACOMs), their subordinate organizations and activities, and other principal Army organizations will determine KM requirements and implement KM Programs to serve their specific organizational needs. The AKO Functional Proponent can provide the opportunity to expand and develop shared AKO capabilities to serve KM requirements spanning multiple organizations. The AKO Materiel Developer can provide technical support, and the ability to leverage the AKO infrastructure for new KM projects. This collaboration will hopefully enhance the sharing of "best practices" and "lessons learned," while at the same time minimizing duplicative infrastructure investments related to evolving KM communities.

The Army's conceptual model believes it is essential to AKO success for the inclusion of a rigorous measurement component. To do this effectively, performance measures for AKO must be established at the macro, intermediate, and micro level, however this sounds easier than the actual evaluation task. According to the Army's definitions in their AKO paper, the enterprise level (Army institutional elements and operating forces) is the macro level, the MACOM headquarters is the intermediate level, and the user level (organization, activity, or AKO Knowledge Center, to include the pilot projects) is the micro level. This three-tiered approach is considered necessary by the Army to ensure its leadership can truly determine the

effectiveness of KM across the Army institutional elements and operating forces, while allowing the MACOM users the opportunity to quantify the "value added" feature provided by individual KM projects.

If implemented correctly, The *Army Knowledge Online (AKO) Strategic Plan* potentially provides a solid framework for the Army to achieve a transformation in how it leverages what it knows. However, successful KM seems to thrive best when placed within a flexible framework of learning and sharing, without a rigid institutional mindset or culture. Although we applaud the detailed nature of the KM goals, objectives and tasks outlined in the Army's AKO Strategic Plan, a careful review of this document must be undertaken often and with an eye to refraining from dictating too many "universal" KM solutions/approaches to its commanders and their KM staff. Also, as a result of its detailed format and prescriptive nature, the Army's AKO document appears to be the preliminary version of an Army KM Doctrine piece not yet completely finished or published. Developing effective KM strategies, to include any semblance of a future "KM Doctrine," has to be undertaken with considerable care so as not to interfere with the "open" and unrestricted nature of groundbreaking KM work. If KM is to work best in a military setting, the Army must ensure its KM Program seeks senior-level advocacy, combined with an "innovation-friendly" environment which fosters grassroots problem-solving skills and the freedom to make mistakes in a supportive atmosphere. At the operational level, unit KM personnel should be responsible for KM requirements definition, assisting in Army KM Program design and implementation, to include quantifiable measurement tools to judge KM's overall success rate. Execution of KM plans requires leadership engagement at all levels. In this regard, all levels of the Army must develop their own implementing plans for KM activities that include specific knowledge-based initiatives to achieve a shared operational vision. The Army will also need to avoid the tendency to treat KM as any other operational discipline, without regard to the unique

nature of KM work---a nature which demands a somewhat unstructured and open-ended organizational model to ensure increased innovation and problem-solving for decision-making.

Service Doctrine/Operational Concept

Army Vision 2010 focuses on six aspects of achieving full spectrum dominance: Project the Force, Protect the Force, Shape the Battlespace, Decisive Operations, Sustain the Force, and Gain Information Dominance. The last aspect is considered essential to achieving success in each of the other aspects. The Army Electronic Commerce Strategic Plan established the overall direction and provided necessary guidance for managing the Army's Electronic Commerce resources in the attainment of Information Dominance. The Army's Knowledge Management Strategic Plan is complementary to that plan, providing a potential roadmap for transforming the Army's institutional elements and operational forces into more of an Information Age, agile and networked organization. The ultimate goal of this roadmap is straightforward: to provide the Army with the ability to leverage and maximize its intellectual capital to better organize, train, and equip a strategic Army combat force. With achievement of this goal, the Army hopes to:

- Leverage historical actions and lessons learned
- Create a force multiplier to deal with downsizing
- Facilitate teamwork and collaboration
- Facilitate communication and decision making among Army leaders
- Foster bottom-up innovation and speed validation of re-engineered processes
- Enable Temporary Duty Assignment redesign based on flow of information
- Create the necessary culture for Army and Army After Next (AAN)[46]

Training

Advances in technology and the resultant need for higher-order learning have led the U.S. Army to design the Classroom XXI Master Plan. This plan includes the introduction of an in-class simulation, and student and instructor integrated computer workstations to support student-centered, experiential learning at higher levels such as officer advanced training. As part of TRADOC's new Master Plan, the Army proposes that full exploitation of the advantages of new instructional technology can only be achieved through a review of the training requirements, the learning process, and their relationships to instructional media. The plan also encourages U.S. Army schools to experiment with the use of technology at the local level.

Based on their analysis of results, Army education researchers concluded that a shift in the Army's current training paradigm to a process that would be less linear was desired at the advanced level. Specifically, these researchers further asserted that a constructivist approach, informed by Cognitive Flexibility Theory (CFT), would best support the Army's training plans. Constructivism is based on the assumption that meaning is constructed by the learner, not imparted by the teacher, and that the construction of meaning is forever cognitively associated with the context in which principles and information are initially encountered. The process of constructing meaning is based on the student's perception of problems and the forming of inter-relationships among information into an individualized concept map. The teacher's role is to present authentic problems, coach during problem solving, facilitate linkages among information and concepts, and provide ways for the learner to externalize understanding for evaluation.

CFT was identified as particularly appropriate to high-level cognitive training found in the military. Advanced military officer training differs from other forms of military training in that there is no one right answer. Procedures, principles and information are applied to the best

judgment of the problem solver in the given situation. All possible situations cannot be predicted, and the problem solver must be flexible in the application of what has been learned.

The emphasis of CFT is on advanced learning. The advanced learner is neither a novice nor an expert. The importance of this stage of learning has been largely overlooked in much of training development. The learning process of the advanced student in an ill-structured domain is unique, and a period of sustained exploration is required to move through this stage. Problem solving in this stage is composed of successive iterations of problem definition, sub-problem definition and discovery, and the construction of goals and solutions. Equilibrium points are created by the student and are annihilated in the problem space as new perceptions are gained. Periods of disequilibrium lead to new discoveries and the creation of new equilibrium points. It is only through sustained involvement in this iterative process that a student learns to attune perception in ill-structured domains and to tolerate the ambiguity of disequilibrium at the performance level of the expert.

The Student-Centered Learning Process

The student-centered learning process has been advocated for advanced training in Classroom XXI. Only by supporting this process and providing an authentic context can we provide the period of sustained exploration needed for the advanced learner, but the process has not been well defined so as to inform training developers and instructors how to implement the approach. To the contrary, a refinement of this approach highlights the highly adaptive nature of this training model, including specific actions leading to innovative training tools and instructional facilitation designed to support the process. The key elements found in a constructivist approach include the following:

- Learning must be situated in authentic experiences that motivate the learner to solve intrinsically interesting problems,
- A student must have an opportunity to view problems from multiple perspectives,
- Collaborative learning supports the development of problem solving skills,
- The instructor's role is to provide coaching in the form of scaffolding at crucial times to allow a student to push past present limits,
- Learner control is necessary to facilitate the learner's construction of understanding, and
- Assessment must be continuous and learner controlled.

Requirements for more complete development include research to design instructional facilitation procedures, the need for cognitive authenticity in constructivist instruction, and integration of learner motivation factors in design and development of new courses.

Lastly, there are two additional implications that new training models may present in the development of better teams, decisionmaking processes, and other key organizational benefits resulting from KM programs. Today, many staff members are trained via informal apprenticeships; working as apprentices (assistants and/or aides) in command and control (C2) teams where they literally "learn the ropes." This tacit experience and knowledge, augmented by classroom learning experiences, helps them to become experts in C2 and gives them the skills to assist their decisionmakers. This training method will likely be eliminated in the future as routine tasks and positions are gradually replaced/eliminated through the use of digital battlefield systems. However, the "cradle-to-grave" approach to C2 will likely require additional staff members who are experts capable of performing those higher level cognitive C2 tasks demanded by the challenges of digital battlefield displays and information fusion. There may simply be a shift of skill levels required in C2 teams, with more skilled team members actually required. Thus, a paradox emerges. There may be an increasing need for additional experts on the

battlefield, while an effective training approach is gradually eliminated. Herein lies the real challenge: to discover, develop and implement effective new training methods to replace the team-centered training methods that are often reduced/eliminated during periods of scarce resources. One solution to be investigated includes incorporating skilled and innovative mentors with the latest prototypes of various communications and information systems into training simulations, as early as possible. This would provide personnel a well-rounded level of experience with these systems early and continuously during their formal training, while also affording them an opportunity to complete an apprenticeship period with an experienced trainer.

USAF

Knowledge Management Concept

Air Force KM efforts have been chiefly centered along two major tracks: a strong IT-related approach favoring KM tools to increase informational displays and knowledge sharing for enhanced decision-making, as well as KM practices designed to improve business processes. The most well-documented AF KM Program resides at Headquarters, Air Force Material Command, the AF's preeminent organization for short-term procurement activities, as well as sustained logistics and long-term acquisition support. As a natural outgrowth of their strong relationship with the commercial business world, AFMC leaders began exploring KM as a potential core competency as early as 1998.[47] In late 1998, General Accounting Office (GAO) and AF Audit Agency reports highlighted the need for AFMC to develop a better "Lessons Learned" system of reporting for AF acquisition activities, to include documenting and applying the knowledge gained from past experiences to current and future projects and programs.[48] In response to these criticisms, a web-based tool was developed in early 1999 to capture AFMC's "Best Practices" and encourage knowledge sharing across the organization. It quickly became

apparent that this tool had wide application beyond acquisition activities and AFMC leaders were becoming more aware of the impact KM could have on leveraging the organization's problem-solving skills.

The result was AFMC's first KM undertaking, a merger of AFMC's Internet-based virtual training program and the "Lessons Learned" Program. A business case analysis was undertaken and in May of 1999 an Integrated KM Program to merge both enterprises was briefed and approved by AFMC's senior leaders.

Over the past year AFMC has undertaken additional planning and resourcing with its AF KM Program to fulfill a perceived vacuum in AF KM activities. One of AFMC's key precepts at the beginning of their KM endeavor was to act as "evangelists" for the KM cause, ensuring that knowledge-based tools and processes were developed to try and enhance organizational productivity and effectiveness. The initial investment in web-based KM tools by AFMC's leaders has already paid off; including the fielding of a KM Home Portal tool operated on secure information networks. This KM Home Portal was used to link various operational support discussion groups, significantly improving logistics support during OPERATION ALLIED FORCE in Kosovo. Although still in the formative stages, the AF KM Program demonstrates significant potential for organizational efficiencies through a solid conceptual framework of KM business practices, web-based tools, and access to virtual training opportunities. For maximum potential, these initial KM efforts should be continued and mainstreamed throughout AF organizations at all levels.

Service Doctrine/Operational Concept

To cope with the rising tide of overseas deployments, the U.S. Air Force undertook a major reorganization of its operational forces beginning in the fall of 1999. Expeditionary Air Force (EAF) was developed to help make overseas deployments more predictable and

manageable, in an attempt to bring more order and sustainability to the quickening pace of deployments.[49] Under the EAF concept, the Air Force has reorganized all combat forces into ten (10) Aerospace Expeditionary Forces (AEFs) that will rotate between stages of pre-deployment, deployment and post-deployment, with two AEFs on-call at any one time. Each AEF spends at least 90 days in the deployment window, followed by a rest period of up to two weeks. After completion of the deployment and post-deployment requirements, the AEFs then spend approximately 10 months engaged in an education period, conducting unit training and participating in routine exercise support activities. Towards the end of this education period, units enter a spin-up block period which is usually scheduled two months prior to the unit's deployment eligibility period, in which members are then engaged in final preparations for their next deployment. This new 15-month cycle enables military members to schedule required military proficiency training, avail themselves of civilian school opportunities, and improve members' overall quality of life. Additional benefits of AEFs include their well-rounded mix of capabilities, since each AEF contains a balanced structure of combat capabilities (including air superiority and strike fighters, bombers, tankers, air mobility, defense-suppression aircraft, and combat support activities) matched to the needs of the intended deployment area, while also designed to complement and enhance the strengths of each designated participating unit.

Despite their powerful mix of assets, not all AEFs will be focused solely on participating in combat operations. Under the flexible AEF construct, AEFs can be specifically tailored to include a varied complement of units for conducting humanitarian relief, natural disaster assistance, emergency response, or other required military support tasks. As part of the new EAF concept, an AEF Center was set-up at Langley Air Force Base, Virginia. Two teams (a Blue team and a Silver team) will alternate at the Center to help units get ready for deployments

by providing information reachback, continuity, readiness monitoring, and training support activities needed to ensure a smooth deployment.

At every stage of a unit's AEF participation, KM practices and tools could play a valuable role in linking geographically separated units before they deploy, ensuring that units have an easier format for exchanging relevant data on training levels, common equipment, force protection concerns, and other information crucial to conducting a successful operation.

Obviously the very nature of putting an AEF package together mandates a vast amount of operational and support data which must be regularly exchanged between a large number of units. However, our research did not reveal a concerted AF KM program initiated to address the complex informational needs of AEFs, therefore further study by the Air Force on the application of KM practices, particularly at the AEF Center at Langley AFB, is warranted and suggested. Developing a dedicated KM Program for AEFs would serve as a means of improving information flow between units, as well as capturing lessons learned and ensuring AEFs have a truly collaborative environment to share their ideas and problem-solve throughout all phases of deployment periods.

Training

The Air Force has its own counterpart to the Navy's NPS in the Air Force Institute of Technology (AFIT) located at Wright-Patterson AFB in Dayton, Ohio. AFIT offers a post-graduate program for technical education of primarily engineering students. While it provides a highly-respected technical education, it is our view that it is not suitable for the more holistic education requirements of the KW. The Air Force also takes full advantage of its quotas for IT students at the NPS and in our view, this offers a better venue for training of Air Force KW candidates.

JOINT

Knowledge Management Concept

Joint KM programs today can be traced back to an initial effort undertaken at Joint Forces Command (JFC) back in the late 1995 when the command was known as the U.S. Atlantic Command or ACOM for short. JX, a unique directorate on the CINC's staff which was dedicated to working special projects for the Commander, was assigned the mission of surveying all available KM programs within the business world, then reporting their findings back to Admiral Gehman, then the deputy commander-in-chief (DCINC) at LANTCOM. After reviewing the JX reports, Gehman was convinced that KM's overall philosophy, major principles, and associated tools had great potential for the DoD so KM efforts were undertaken and funded by 1997. The basic concept that JX began its KM efforts was very simple: find out what "good things" the organization is doing and then find ways to post these best practices in an easily accessible database for everyone to read and benefit from. ACOM knew that there was a great deal of tacit knowledge within the organization that the members were not aware of, but could derive operational effectiveness from learning about. Tacit knowledge is knowledge that is implied or indicated, but not actually expressed, such as knowing who and where the true subject matter experts reside within an office, rather than just relying upon the names and functions detailed on a typical organizational chart. Gehman gave J2X a budget and staff to try and find ways to capture this tacit knowledge at JFC and the KM effort was born. The original efforts revolved around five key activities which came to be known as "Knowledge Today:"

- Utilization of web-based technologies and commercial-off-the-shelf (COTS) products to ensure universal access, lower costs, and ease of implementation and future updating

- Empowering Subject Matter Experts (SMEs) to assist in designing KM strategies and tools, facilitating solutions which are truly home grown, as well as highly relevant to the organization's mission and tasks

- Developing flexible KM tools to enable the organization to share knowledge and network solutions

- Utilize a Database-driven KM approach, with sufficient archives and browser-based technology solutions allowing SMEs to upload their own information and share ideas cross-functionally and with other organizations through use of both Intranet and Extranet platforms (these networks were originally designed along secure lines and infrastructures)

- Through collaboration and knowledge sharing activities, create a positive environment whereby a culture of change, innovation and improved processes is fostered.

JFC's "Knowledge Today" initiative created an Intranet, which revolutionized the way the organization looked at how they did they everyday tasks. Unnecessary reporting was eliminated because status reports could be posted on the Intranet. Knowledge sharing was not just a random event, but an everyday practice which reaped improved processes, policies and organizational effectiveness. With KM as a guiding principle, JFC activities took a hard look at their real business and whether they were providing customers with relevant support. Use of the Intranet and Extranet resulted in fewer meetings which were also shorter, a reduction in phone calls or last minute requests for data, while cross-functional teaming became the norm rather than the exception. Overall JFC just seemed to work more efficiently and KM practices were gradually being adopted because members saw a distinct improvement in how they related to other parts of their own organization, as well as to their external customers. The cultural change had started, but could it be sustained?

Eventually the KM mission was moved from JX to a directorate known as J-9/Joint Experimentation. A division within J-9 now manages all KM research and development efforts for JFC, as well as for all joint forces. Their goal is to survey areas where joint operations could benefit from KM practices or tools, then identify solutions to improve knowledge sharing and

business processing. One of J-9's earliest KM success stories was an initiative which utilized contractor support to design a collaborative environment for all service battle labs to exchange project information. This effort has already reaped benefits by avoiding needless duplication of effort among battlelabs and facilitating knowledge sharing among all the services' project managers, who are now linked through robust network tools. What does the future hold?

Currently there are two major KM-related initiatives which hold promise for further collaborative knowledge sharing and process improvement. One of these efforts is being undertaken by DoD's chief communications officer, the J-6. Known as "The Global Grid," Defense Secretary John Hamre completed DOD's final policy on the U.S. military's new Global Information Grid, a "globally interconnected, end-to-end set of information capabilities." In a widely distributed policy statement signed March 31, Hamre directs the services and defense agencies to base all national security missions "on a common communications and computing architecture to provide a full range of information services at all major security classifications and information handling caveats." While the policy became effective immediately, Hamre directed the Defense Department's chief information officer to "institutionalize" the guidance into DOD within 180 days. In addition to the GIG policy, the Assistant Secretary of Defense for Security and Information Operations has also issued a new strategy which advocates a three dimensional approach to future information operations. This 3-dimensional approach includes a look at operations, personnel and training activities. This internal look is designed to implement a joint strategy for improving network-based warfare; including, developing better tools and business practices to enhance the protection of vital information, increased training for new personnel to provide tailored information technology support, and, leveraging as many new security, data warehousing, data mining, and collaborative technologies as possible to solve emerging data problems. These two approaches are just the beginning however. There still

exists a need for an overall DoD-level KM strategy, implemented and fostered with resources funded by a DoD-level activity, with applicability for all joint operations.

CHAPTER THREE

The Knowledge Warrior

"When people open a door and go outside, whether the do good, do evil, or even work marvels is due to the idea in their minds before opening the door."

Zen

Chapter Overview

This chapter will depict the possible employment of the KW within the military. The KW would bring to the future fighting formation a discernable, value-added increase in knowledge available to both the command and the organization. The KW would be recruited base on a set of individual attributes commensurate with and fitting to the roles and missions of the 21st Century military.

What are KWs and how do we Train/Develop Them?

KWs serve as a living bridge between information and the commander. That is not to say that the commander relies solely on input from the KW. Far from it, he remains, as he is today, able to reach any available source of data/information.

In his capacity, the KW is intimately aware of the commander's priorities and vision. As a loyal subordinate, he embraces and fully supports his commander's intent and vision. Armed with his commander's priorities, the KW undertakes, on a daily basis, a search for what can be called "high payoff information," i.e. information that impacts, in some form or another, the situation, the mission, and the commander's objectives. Some critics object that there is nothing revolutionary about this. As a matter of fact, this is the marching order of every military staff. Yet, we believe the emergence of KWs to be revolutionary for the following reasons:

- Unlike military staffs, whether joint or service-related, who look at the situation, the enemy, and a myriad of other factors from their prism or assigned lane, (e.g. personnel, intelligence,

operations, etc.) the KW adheres to no particular angle. He looks at information from a wider scope and with no particular discipline in mind.

- Unlike a regular military staff that searches for, merges, and analyzes information through one or more internal layers, the KW is a one-entity piece. He is virtually a "one-person show," responsible for the entire process of searching for, assessing, and synthesizing information into knowledge.

- While staffs communicate directly to the fighting formations that they support, the KW does not. The traditional staffs remain focused on both the commander and their supported fighting formations. KWs do not undermine or lessen the roles and functions performed by the staff. Far from it, the KW's charter restricts him from even participating in staff interactions or processes. Although removed in less of a role from the fighting formations, the KW remains intimately aware of the forces' conditions, capabilities, and overall requirements.

- Unlike some members of the staff (e.g. chief of staff) who can be inserted in a command role in the absence or incapacitation of the commander, KWs do not normally assume any command responsibilities, perhaps only under extreme circumstances. Furthermore, KWs do not represent the commander in any form or capacity, as is the case with some other staff members. In terms of chain of command, the KW reports directly to the commander and acts upon his orders. Communication between the commander and the KW is considered privileged and releasable only by order of the commander. This, of course, is within an ethical and proper context.

The KW serving in a major military headquarters (e.g. joint combat force deployed in a theater of operations or at home) has, as a main mission, the development and submission to the commander of relevant information -- knowledge.

Attributes of the Knowledge Warrior

First and foremost, candidates for the KW program must espouse a thirst for learning. As career-long students, KW candidates should have demonstrated, in their past, an affinity for knowledge. In terms of education, KW candidates are university graduates, but not necessarily holders of a graduate level degree. Areas of university study could include degrees from information-related fields, but these are not firm pre-requisites; therefore, a diverse program of academic study is also a strong basis for acceptance into the KW Program.

Having completed formal education, the KW candidate also needs to be equipped with a proven track of recorded work experience. This experience should not be judged by its relationship to this information field as we know it today. Rather, it should be assessed based on the KW's record of performance, especially in the areas of management and decision-making abilities. Based upon his experiences and record of achievements, KW candidates should have attained a fairly senior-level in the organization, (e.g. within a military framework, either a senior O-4, Major; or, an O-5, Lieutenant Colonel). It is important to recognize that this criteria serves as the foundation for the effective development of the KW. This record of efficient work performance does not have to be in the military. It may be all civilian experience, either in the public or private sector. It could also be a combination of both military and civilian experience, however, KWs must be well grounded in all aspects of information technology. Still, information technology should not serve as a pre-requisite, since KW candidates will be adequately trained. As seductive and powerful as the technology can be, knowledge and the people who develop and use it are the focus. (Footnote S3)) What is of crucial relevance, as was hinted at earlier, is the ability of the candidates to use proper judgment and reasoning since this is, in a sense, the essence of a good KW.

In the review of a KW candidate's work experience, one should look carefully for a record of demonstrated flexibility and adaptability. This is a valuable trait that indicates that the individual is pliable enough in terms of mindset to absorb new information that is loaded with cultural, religious, and a myriad of other nuances. An effective KW does not await instructions in order to function. He is flexible enough in both mind and spirit to engage any given situation based on its aspects, merits, nuances,... 53 Furthermore, this points to the capability of the candidate to assimilate and incorporate (into knowledge) various concepts or factors that are somewhat alien to him by birth or experience. Of particular interest when examining the

candidate's record is to look for evidence of international exposure. This does not have to translate into actual residence in foreign countries, since this by itself may not be a strong indicator. Contrary, there needs to be a search for demonstrated keen interest, from the past of the KW candidate, in a wide variety of international aspects or living (e.g. service in the Peace Corps, military attaché or foreign liaison officer, business representative in either a foreign city or for an international enterprise, a student in foreign affairs, etc.). This international exposure is of great value since it indicates potential in the candidate's synthesizing ability for non-U.S. information. Additionally, this point becomes essential when the KW enters the realm of accounting for foreign perception as a significant element in the warfare equation.

The ability to effectively communicate and express his thoughts into lucid knowledge is the thread that truly weaves the KW's rich tapestry of applicable experiences, cultural awareness, and operational impact. Both oral and written communications are key components of the KW's tool kit. [56] This capability is best assessed by subjecting the candidate to a series of interviews where he is given the opportunity to express himself and articulate his thoughts in a manner that emphasizes both clarity and purpose. The KW's greatest allies are his words. He uses them in a simple and succinct way, yet the KW is not considered to be a "yes" man. He weighs his words carefully and applies them fittingly to the task. In assessing the candidate's record and persona, one needs to confirm the absence of a politically oriented disposition. This is the sin of being somewhat of a "yes" person. The KW's unflagging rallying cry is to speak the truth as he sees it and only as he sees it. This attribute is necessary regardless of any perceptions, convictions, biases, or inclination to please the commander or any other stakeholder. Being identified as a "straight shooter," unflappable, and able to voice the truth and speak with confidence in his position is a major pre-requisite for being an effective KW. This attribute points to the KW's necessary strength of character, plus a strong adherence to moral and ethical values. The quest

for the truth, regardless of its form or content, will be what motivates the KW at all levels, in all capacities. For by exposing the truth as he sees it, unhampered by political affiliation or loyalties, the effectiveness of the KW as a combat multiplier emerges.

Upon evaluating a KW candidate, we should look for traits of a personality that demonstrate both confidence and assertiveness. A healthy self-esteem or image is a must for a successful KW. As the purveyor of critical knowledge to the commander, KWs should demonstrate a firm sense of self-assuredness in their capability. That is not to say that a KW is infallible in his synthesis of information or in his products (KPs). Far from it, one can be wrong while still harboring a positive self-image and powerful conviction in his abilities. Firmly planted with his feet, armed with an unflagging confidence in his abilities, our KW is able to navigate carefully in the often-treacherous waters of "turf conscious" information providers or sources. This attribute is of immense value since, in a way, it shields the KW from those who may not fully understand or appreciate the value of a knowledge-based function within the organization. KWs are, after all, often placed in a somewhat unprotected, non-command position that requires a certain degree of insulation from the expected criticisms and ill feelings by other staff members. This we shall call a "survival trait." Possessing a strong and vibrant self-esteem is key to successfully operate in the unstructured and often chaotic world of military commands and staffs where information exchanges flow at high speed. This, in return, feeds the KW's assertiveness and portrays him in the eyes of all around him as an officer with "presence." It would be a near disaster for a KW to have to resort to his military rank or close affiliation with the commander in order to secure the necessary professional support from staff members or other affiliates to effectively perform his mission.

In the toolkit of the KW, one has to detect intuition.[57] A healthy sense of intuition serves the KW well and allows him to quickly hone his efforts on the salient, relevant issues or aspects.

Equipped with this sort of "sixth sense," the KW is able to better gauge certain situations, as well as look for and assess ramifications. As an explorer in the information jungle, this "sixth sense" can also serve as an early warning capability. This valuable trait often permits the KW to "tune in" to his commander. He understands the commander's position vis-à-vis certain issues or situations, and is often able to predict how he will react, given a particular scenario or circumstance. Additionally, this trait increases the likelihood of greater confidence placed by the commander in his KW. When the commander begins to see the KW's capability in action, he most likely reciprocates by allowing a greater sense of openness between himself and his KW. This is of great importance to successful knowledge-based operations, since it solidifies their relationship and united perspective. Further, this trust affords the KW a much deeper appreciation and understanding of his commander's intent, direction, and overall mindset.

As the reader can see, there exists a relationship of utmost trust between the commander and his KW. This necessitates a degree of loyalty that is irreproachable and an immaculate level of personal and professional loyalty on the part of the KW. This has to be probed meticulously when we consider KW candidates. Any evidence of breached loyalty or compromise in integrity in the candidate's past should serve as a disqualifier for consideration. A failure in this area serves as a fatal wound to the KW's status and renders him absolutely useless to both the unit and the commander. Communication between the commander and the KW is considered privileged by the latter and not to be discussed unless authorized. This is critical since the KW cannot be viewed as the commander's shadow or spokesperson. Furthermore, the KW must constantly maintain a professional relationship with the commander and the staff. It falls upon him to ensure that he keeps himself above "office politics" or petty rivalries. This can only serve to blemish his standing and undermine his service. This higher-than-usual threshold of integrity

and loyalty is needed for the KW to professionally survive and effectively contribute to the fighting formation.

For the KW, perception is as important as reality, since perception is in the eyes of the perceiver a "quasi-truth." Not only must the KW ensure that his personal and professional conduct is beyond reproach, he must also keep a vigilant eye on the shadows that his behavior casts. Being a "one-person show" is a somewhat non-traditional and often misunderstood role, placing the KW in a vulnerable position. A mistake of minor character committed by a staff member could have repercussions either due to, or perceived to have been caused by, the KW.

Skeptics of the KW's contributions and opponents of his presence will abound. Unfortunately, these groups are closely observing him for any hint of negative aspects. A character flaw, real or perceived, provides these forces with incredible ammunition to do serious damage to the KW program while still in its embryonic stage. It is of paramount importance for the supporters of the KW program to recognize this from the beginning and be prepared to survive the potential onslaught of criticism, which may be leveled by the numerous critics. Heading off these critics and preventing them from damaging or terminating this initiative requires a strategy based on rapid promotion and integration of the KW concept at the lowest possible tactical military level.

One of the most obvious criticism recognized is the one leveled by the rank and file members of the senior military staff as we know it today. These traditional members may view the KW as a threat encroaching on their "turf" or assigned tactical lane. A particular member that comes to mind is for example the operations officer of a fighting formation. To the operations officer the KW may be perceived as a "redundant" layer with no particular apparent utility; yielding no observable results. He may think of the KW, in light of his special link to the commander, as a rival, interfering in or affecting the planning and conduct of operations. He

may not be alone in harboring this view toward the KW. The intelligence officer, the logistics officer, the chief of staff, and others in the fighting formation could possibly look at the KW as someone who may know enough about their particular fields to possibly undermine their coveted positions by the side of the commander or "steal their thunder". These and a myriad of other actors represent a minefield for the KWs, which have to be carefully, but courageously, negotiated by the supporters of the program. Unchecked from the onset these potential foes can unleash forces or set in motion events, which may sink the program. Therefore the "first" KWs must be immunized with robust professional and personal credentials, which will shield them from unwarranted criticism. The professional and personal credibility of the KW or his established "presence" is of crucial importance. Perception, similar to the truth is a major factor in the KW equation.

All these factors exact an immense toll of responsibility on the officers managing the selection of ideal candidates for the KW Program. Although we list and address KW attributes, detailing the selection process and its mechanisms are for future papers. It suffices to say at the present time that, at a minimum, candidates should undergo numerous personal interviews and a comprehensive background check prior to acceptance in the KW Program.

However, no matter how comprehensive the assessment tool, these other evaluation methods cannot be used as a substitute for the one-on-one interview or series of interviews with the KW candidate. The interview offers a priceless look at the candidate with a continuous eye on his suitability as a KW. By no means what is sought here is a "perfect mind." Far from it, evidence of living experiences and successful personal and professional triumphs over hardship and circumstances are to be sought and assessed. To that end, one must be accepting, tolerant and expectant of failures in life. It is the record of the candidate's life, which matters the most. This record is the one that will actually shed light on the candidate's mental acumen, as scores on

a standardized test cannot. This trail of life experiences and challenges is a major discriminator for assessing the candidate's suitability as a KW. In his quest, indicators of self-control are pursued and assessed. This mental characteristic is of great value since it denotes the candidate's tolerance level to high stress situations or conditions. Maintaining an unagitated emotional state is a key prerequisite for an effective KW. This calmness and tranquility of mind permits better learning, assimilation, analysis, and synthesis--resulting in expressions of basic information that have been transformed into relevant, experience-infused knowledge.

CHAPTER FOUR

In Search of the Knowledge Warrior (KW)

> "Gather information from every possible source. Leave no stone unturned. Use spies, consultants, informants. Perceiving the enemy's strategy allows you to defeat it. Knowing the enemy's position and movement prevents unpleasant surprises. Information is the fabric of tactics. You can never know too much about your enemy, yourself or the situation."[50]

Chapter Overview

In the search of our KW candidates, the desire is to have personnel who have an exceptional capacity to synthesize, assimilate and digest a deluge of data/information. They must also have the prodigious capability to discern what is relevant and salient to the commander and the military milieu. This capability can only be "seasoned" from experience with the use of repetitive scenarios presented to the KW via virtual or real -time forms. With these repetitions, the KW will solidify his/her "know how" by consistent and updated feedback. This chapter will address a wide array of current measurement tools which could provide

KW Assessment

The evaluation of potential KW candidates should include a well-rounded approach to discerning the individuals cognitive skills, personality traits, and overall At a minimum, these evaluations should include the following basic measurement criteria:

- cognitive capacities
- temperament
- perspective and focus

Cognitive Capacities

Cognitive capacities are concerned with the development of an individual's thinking skills, the mastery of integrating processes and using analytic logic. In addition, one's ability to

formulate precepts and solutions to problems which are here-to-fore, non-existent, is measured. Cognitive capacities may be assessed using the Strategic Leadership Development Inventory (SLDI). The SLDI appraises an individual's conceptual abilities and leadership skills. It also could provide a thorough assessment of the KW candidates' conceptual competence, political sensibility and future vision, as portrayed by the candidate's former superiors, peers and subordinates. These "performance reports" would provide a historical map of the candidate's performances in past assignments. They would also surmise how the individual has handled difficult and conflictual situations, how goals are achieved, his/her input or contributions to the staff and the nature of his/her interpersonal relationships. These reports could also provide some indication of the KW's future performance. The most important aspect of the SLDI is that it could provide a type of criterion of leader effectiveness, through the eyes of former superiors, peers and subordinates.[51]

Cognitive Tests

Furthermore, cognitive assessment involves evaluation of an individual's intelligence. Intelligence is defined as: "the ability to learn or understand from experience; ability to acquire and retain knowledge."[52]

A myriad of psychologists have additionally defined intelligence, using two subgroups designated as: a)crystallized intelligence and b)fluid intelligence. The former, represents the accumulation of knowledge or acculturated knowledge which is determined by general knowledge or vocabulary testing. The latter, indicates abstract understanding and inductive reasoning capabilities, discerned by use of analogies and number series completion tests. [53]

The recognized "gold standard" of measurement of intelligence is the Intelligence Quotient (IQ) testing. Most, if not all of the KW candidates may have these available from prior

schools. Additionally, perusal of academic records could also provide some insight into the candidate's cognitive skills.

Excellent representative IQ tests include the Wechsler Adult Intelligence Scale (WAIS) and the Stanford-Binet (SB) tests. Both are excellent measures of crystallized intelligence.

- The WAIS' verbal sub-tests (6), measure crystallized intelligence and the performance sub-tests (5), expose fluid intelligence. Each sub-test is administered separately, with the test requiring one (1) hour for completion of the 231 items. Of note, the verbal sub-tests are influenced somewhat by education and social class. In addition, evidence exists that this measurement tool has a high correlation with academic and occupational attainment.[54]

- The SB test is a set of 15 sub-tests and offers an immense variability of items. It also measures both crystallized and fluid intelligence. The items are grouped by their level of difficulty and the test serves as a predictor of educational achievement. This test requires 60-90 minutes to complete. The problem observed is, the difficulty in comparing the scores of younger children to those of the adolescents, leaving the false impression that intelligence is identical in the two groups.[55]

Table 4-1 compares the Stanford-Binet (SB) with the Wechsler Adult Intelligence Scale (WAIS). The number (#) of items for the SB are variable dependent upon the subject's age. The last revised edition of the SB measures fluid intelligence (FI), with both tests, being strong measures of crystallized intelligence (CI). Of note, the military primarily uses aptitude batteries to provide them with indicators of potential vocational placement of recruits.

Table 4-1

Cognitive Test	Completion Time	# of Items	Ages Tested	# of Sub-Tests	Fluid Intelligence	Crystallized Intelligence	Successful Intelligence
SB	60-90 mins.	varies	2-24	15	++	+++	-
WAIS	60 mins.	231	adults	11	+++	+++	-

Temperament

Temperament deals with one's ability to control his/her anger and whether or not one is explosive and "danders" easily aroused. Certainly, volatile tempers can be very disruptive to any organization, by creating fear, distrust and an atmosphere of suspicion. Those who are even-tempered have greater capacity to improve the organization's value of human resources.

The KWs will heavily rely upon this asset to ensure his/her survival from the commanders' staff's accusations, where the KW is perceived as easy prey and the "common enemy". As was previously cautioned, the KW could be regarded as a threat to certain staff members' continued existence because of his/her close proximity to the commander. Our KWs must be resilient, not only to dissuade these perceptions, but to enable the staff to develop greater competence and self-worth, thereby promoting unit cohesion and trust.

Perspective and Focus

Evaluation of perspective and focus could look at how the KW judges information or situations in a particular point in time, through his/her lenses and how he/she could provide their "spin." Using all of the information gathered from various sources, the KW could predict and

propose outcomes/courses of action for the commander. Another piece that could be evaluated, is how the KW "peels off" or "teases out" extraneous information and leaves what is relevant and essential for mission accomplishment.

This is the *sine qua non* for our KW's. The entities the KW's use to enhance commanders' decision making proficiency are knowledge packages (KPs) or "nuts and bolts", "bulletized" fact sheets. These KPs could delineate varying scenarios/contingencies and proposed courses of action. Perspective and focus attributes could be explored using the SLDI, where conceptual skills are culled out.

Personality Assays

By uncovering one's personality, we could assess temperament. Personality assessments are important to discover an individual's psychological "make-up" and one's preferences for information acquisition. What is evaluated is how one accesses information, it's types, sources, the manner it's presented and how one uses the information to effect decisions. In addition, indications are provided as to how one organizes and approaches life situations.

Dr. Carl Gustav Jung, a Swiss psychologist, formalized eight (8) personality types, based upon how one perceives or takes in information and how one uses information to make decisions. His 8 types are:[56]

Extraverted thinking	Introverted thinking
Extroverted feeling	Introverted feeling
Extroverted sensitive	Introverted sensitive
Extroverted intuitive	Introverted intuitive

- The Myers-Briggs Type Indicator

Later, Isabel Myers and Katherine Cook Briggs expanded upon Jung's theory of eight personality types using preference in four life situations, based upon: a). how one sees reality; b) how one judges reality; c). where one goes to seek energy for life; and, d). how others perceive his/her orientation to the world.

Each of the four (4) areas have two (2) possible choices. These dichotomies are:

a) Extroversion (E) or Introversion (I)

b). Sensing (S) or Intuition (N)

c). Thinking (T) Judgements or Feeling (F) Judgements

d). Judging (J) or Perceiving (P)

Each individual chooses one from each pair, which is his/her preference. The combinations of these 4 preferences thus becomes one's psychological typing.[57] Using the letters in parentheses the extant possibilities provide Myers-Briggs sixteen (16) personality types.

The Myers-Briggs Type Indicator (MBTI) is an inventory, not a scored entity or test. One personality type has no advantage over the other and there are no right or wrong types. It indicates, with clarity, one's preference strength. As per Peter Briggs Myers:

> "Each of us has a set of gifts, a set of mental tools that we have become comfortable using and thus reach for in the everyday business of living. Although, we all have access to the same basic tools in our psychological toolbox, each of us is more comfortable with and thus prefers a particular task. It is our unique set of these preferences that gives us our distinct personality and makes us appear similar or dissimilar to others.[58]

- Gordon Personal Profile-Inventory

Evaluation of those aforementioned "desired" KW attributes, must be performed. Specifically, elucidation of trustworthiness, intuitive skills, communicative skills and levels of integrity and self esteem, must be done. Also, the KW's educational and work experiences could be surveyed.

Many of the desired KW attributes could be assessed using the Gordon Personal Profile-Inventory (GPPI), currently offered at the Industrial College of the Armed Forces (ICAF). This assessment tool is a combination of two (2) instruments; a) the profile and b) the inventory. Overall, this instrument provides an evaluation of self-esteem.[59] The profile measures the following:

- Ascendancy, which is characterized by individuals who adopt active roles in the group, are self-assured in interpersonal relationships and can make independent decisions. Low scorers, on the other hand, tend to let others lead, listen, rather than talk, have low self-esteem and are passive.

- Responsibility is defined by high scorers who demonstrate "stick-to-itiveness," are persevering and determined individuals. In contrast, low scorers are unable to "stay the course" on assigned tasks, are irresponsible and less dependable.

- Even-tempered defines individuals who display emotional stability, are worry, anxiety and nervous-free. In opposition, low scorers, are nervous, easily frustrated and are hypersensitive.

- Sociability, as an attribute, measures one's comfort level around others. High scorers are gregarious, enjoy being around others and are extremely sociable. In contrast, low scorers desire restrictive social contacts and are not gregarious.

The inventory portion of the GPPI measures the following:

- Cautiousness, defines individuals who are risk averse, who "weigh the evidence", prior to making decisions and are not impulsive. The low scorers, are risky individuals, chance takers, who make decisions in the "spur of the moment" and act impulsively.

- Original Thinking, as an attribute is indicative of persons who are "intellectually curious", enjoy working on difficult problems and thinking about new ideas. To the contrary, low scorers display a dislike for working on complex, complicated problems or dealing with thought provoking issues or discussions.

- Personal Relations, as a character trait, portrays high scorers, who have trust, confidence and faith in other people. They are also, tolerant, understanding and patient with others. On the contrary, low scorers, display a lack of confidence and faith in others. They have tendencies to be critical of and irritated with people.

- Energy, as a characteristic, shows those who have vigor and vitality and can very rapidly accomplish more than the average person. At the low end of the scale, are those who prefer a slower pace, are easily fatigued and are less productive.

Table 4-2 below compares Myers-Briggs Type Indicator (MBTI) with the Gordon Personal Profile-Inventory (GPPI). Note that the assessment of leadership potential serves as a discriminator between the two tests, but favoring the GPPI, as does evaluation of emotional stability. ID best person indicates if the measure identifies the best person for a job/task/assignment, which neither test exceeds in measuring.

Table 4-2

Personality Test	Leadership Potential	Emotional Stability	ID's best person	# of Items	Military Adaptation
MBTI	–	+	–	126	+++
GPPI	+++	+++	+?	32	++++

The Big Five

Additional appraisals of the KW candidate, could also be warranted. These could include measurement of "the big five," or five (5) factor model of personality variance. To elucidate, the five factors are: neuroticism (anxiety); extroversion; openness; agreeableness; and conscientiousness.

These have been designated by D.W. Fiske, (1940), as the five basic dimensions of personality. Dimension I is extroversion/introversion, which alludes to whether one's frame of reference is outside (extro) or within (intro) oneself. Dimension II is agreeableness, which ascertains if one is friendly vs. hostile. Additionally, an individual's inclination for altruism, nurturing, caring vs. spitefulness, jealousy or self-centeredness, may be depicted. Dimension III is labeled conscientiousness. The distinction made here is whether one is scrupulous or responsible vs. not dependable, fickle or careless. Dimension IV is entitled neuroticism. This explores an individual's emotional stability. And finally, Dimension V is referred to as

openness. This is akin to the intellect, how one accepts new experiences and ideas and tolerates ambiguity. This dimension portrays persons who are innovative, creative and curious vs. those who are close-minded, disinterested and factual.[60]

Leadership Assessment

The following leadership assessment models could be reviewed and adapted for use in a KW screening and development process.

The Strategic Leadership Development Inventory

Use of this instrument was previously discussed. For the KW candidate, it could serve as a self-awareness tool, by providing an evaluation of his/her past performance, through the eyes of his/her former commanders, peers and subordinates.

The Modified Career Path Appreciation

The final assessment tool to be discussed is the Modified Career Path Appreciation (MCPA) battery, which was introduced and designed by ICAF professors. These face-to-face interviews were developed to tap the individual's conceptual skills/abilities and to predict the future progression of the same. These interviews could elucidate the KW candidate's goals and could offer required self-directed changes, in support of achieving these goals. This hereby, serves as a self-assessment tool. The subsequent interviews could propose behavioral adjustments and other measures necessary to place the individual on the road toward goal achievement.[61]

Table 4-3 compares the Strategic Leadership Development Inventory (SLDI) and the Modified Career Path Appreciation (MCPA). Both are highly adaptable to the military, while self-assessment, growth potential and interviews are strong discriminators, favoring the MCPA.

Table 4-3

Leadership Assessment Tool	Self-Assessment Tool	Growth Potential	Leadership Potential	Successful Intelligence	Military Adaptation	# of Items	Conceptual Skills
SLDI	++	+	+++	+++	++++	?	++
MCPA	+++	+++	+++	++	++++	48	++

Interviews

It should be stated, that one-on-one interviews could have great promise of providing a better understanding of the KW candidate, since eye contact, body language and moods could be observed. Additionally, during interviews, the primary focus is almost exclusively on the individual, rather than how the individual conforms or fits into a larger normative group. This engenders trust on the part of the interviewee/interviewer. Moreover, the KW candidate could clearly define and explain his/her successes/failures in life upon which he/she capitalized. The KW candidate could further expound upon his/her goals and predict those courses of action to attain the same. During these interviews, communicative skills could be observed.

Successful Intelligence -- We Aren't What We Score

The subgroups of intelligence were previously mentioned. Interviews could be sound methods of elucidating a third subgroup of intelligence- that of successful intelligence. This is further categorized into three (3) parts, namely:

1. Analytical Intelligence
2. Creative Intelligence
3. Practical Intelligence

Analytical intelligence is what schools and institutions of higher learning value. It is required for problem solving and judging the quality of ideas. Creative intelligence is required to formulate ideas and problems. While practical intelligence, would be necessary for using ideas and their analyses effectively, in day-to-day living.[62]

As previously referenced, we are not seeking "perfect minded" individuals. Such do not exist, as humans are fallible beings. To that end, we must be accepting, tolerant and expectant of others' failures in life. One cannot improve upon perfection, but, one can strive toward perfection, by improving upon those past deficiencies or commissions of error, and ultimately learn from them. What is sought are individuals with demonstrated successful intelligence, who have succeeded, whether by their own standards or those of others, and have managed to acquire, develop and apply a full complement of intellectual skills to everyday living. These are people who are well grounded in their capabilities and are aware of their strengths and weaknesses and who capitalize on their strengths to compensate/correct their weaknesses.[63]

What about those who don't test well? This is the basis for the successful intelligence concept. Persons who do not fare well on tests, demonstrating test aversion, but, who possess exceptional creative and practical abilities, are defined. These capabilities are responsible for their life successes.

This same theory was experienced and tested by Dr. Robert Sternberg, who rose to become a full professor at Yale University, after failing IQ tests while in grade school. He states:

> "I learned in elementary school, that if I was going to succeed, it wasn't going to be because of my IQ. I also learned... that just as low scores on tests of inert intelligence don't preclude success, neither do high scores guarantee it." [64]

He further tested his theories and found that:

> "Our study proved a number of important points relevant to my theory of successful intelligence. First, it is possible to test for creative and practical intelligence, not merely for analytical intelligence. The students

who had tested high in creativity, for example, proved to be creative in our program. Second, it is possible to teach in ways that improve all three aspects of successful intelligence. For example, students with high analytical ability who were challenged to be more creative and practical became so. The students in the control group who were relatively low in all three kinds of ability also had a chance to stretch their abilities. And finally, students who were relatively high in all three abilities, ... showed a degree of competence that was well above average. As I studied these results, it became more obvious than ever before that we shortchange our students – and our society – when we measure their intelligence and determine their future on the basis of psychometric tests that may, to a degree, be an indicator of what they already know, but not of what they may be able to accomplish. We value the students with strong memory and analytical abilities, and we practically write off those with strong creative and practical abilities. If we want to capitalize on the gifts of our students, at any level, we need to change our educational practices so that students are taught and assessed in ways that recognize their strengths, not just their weaknesses. Thus, the true measure of your intelligence is not a test score; it is in your willingness to develop your own talents."[65]

We therefore, propose that the interviews and other measures of successful intelligence be weighted more than that for standardized/institutional testing, in the selection process of our KW candidates. We also propose to take that "leap of faith" that espouses that successful intelligence provides us with clearer indicators of effective strategic military leaders, inclusive of our knowledge warriors.

We further propose that our KW candidates be evaluated at NDU, where a well coordinated strategic leadership development platform currently exists. In addition, there is, understandably, a strong influence of military ideologies. Non-selected candidates, would greatly benefit from NDU's designed self awareness tools, where proposed behavioral and self-directed modifications could be made, to enhance their abilities as strategic leaders. Moreover, all candidates could be exposed to the joint environment.

The Ideal Virtues

Our proposed KWs will need to function well in the military milieu. We have previously alluded to the possibility that there may exist significant challenges and obstacles, which may potentially berate and derail the KW program. Many, if not all of these obstacles, may stem from the commander's staff's fears, jealousies and concerns of self- preservation, from the KW's presence. There could be distrust that the KW represents the commander's "heir," fear that the

KW would trample on their (staff's) "turf," fear that the KW would have a "hidden agenda" and finally fear of the "unkown," the new entity- the KW.

To withstand these challenges, our KW's could be armed with the following ideal virtues/values:

- **Trust**

Trust and trustworthiness could be required to pacify the naysayers/doubters of the KW program. Demonstrated allegiance to the commander by the KW could effect a solid and open relationship between the two. This could proffer the opportunity for the KW to fully understand and be attuned to his/her commander's direction, intent and mindset. If the KW could earn the trust of the staff, he/she could assuage their fears and instead profit from them as allies. Knowledge-sharing could be easier to accomplish in the knowledge market, with each party understanding that all knowledge transactions would be bounded in truth.

In addition, if the KW could create an environment where each actor, - the commander, the staff and the KW , had mutual trust, this could clear the path for the military's successful transformation into a knowledge-based organization. In the absence of trust, no knowledge market could effectively operate.

- **Altruism**

Altruism could be of value to the KW, as this virtue could facilitate knowledge-sharing, too. The KW's passion and *modus operandi* could be to serve for the "good" of the military organization. Knowledge managers and workers proposed that three (3) factors must exist for knowledge markets' survival, ie. reciprocity, repute and altruism. These are the "currency" offered during knowledge transactions. Reciprocity states that knowledge sellers expect a return on investment. There is also the expectation that what is offered is worth the investment. Repute indicates that knowledge sellers want to be recognized as the ones "in the know." This

increases their profits from enhanced market shares. Altruism is considered the most virtuous of the three and connotes a "higher" calling, where the KWs are "sacrificial" lambs.[66]

- **Integrity**

Of paramount importance, is the virtue of integrity. A KW could not demonstrate his/her capabilities unless there is irrefutable evidence of forthrightness. The KW could exhibit himself/herself as principled individuals, who guard knowledge transactions as sacred and privileged, unless otherwise indicated. To continue, this virtue could corroborate the KW's claims to represent honest brokers. Integrity could point to the KW's strength of character, with a strong adherence to moral and ethical values.

- **Tolerance for Ambiguity**

An effective KW could demonstrate an unyielding tolerance for ambiguity. After all, an environment impregnated with uncertainty, could be the KW's operational "home". The KW could develop his/her "knowledge packages" using untested and foreign concepts. Working under uncertainty, could become second nature for the KW, who could be placed in an unprotected environment, where distinguishing allies from foes, could prove difficult.

- **Intuition**

Intuition, as a KW value could also be required for our KW's successful operation within the knowledge market. In an environment where uncertainty could rule, possessing this "gut feeling" virtue, could facilitate his/her navigation in the information "maze." Moreover, this value could afford the KW more comfort and flexibility to absorb and synthesize vast amounts of information and propose plausible courses of action.

- **Humility**

Humility, as the final proposed virtue, could demonstrate the self -sacrificing nature of the KW. Previously, we proposed that the KWs could serve as the revolutionary catalysts, to

effect a military cultural transformation. Once accomplished, then the need for KWs dissipates. The KWs could be made totally aware of their temporary status, but notwithstanding, work diligently to this end, because the survival of the organization could be valued more than that of self preservation. Humility also could allow the KW to solicit and enlist the support and assistance from the commander's staff.

As previously postulated, our proposed KW's could represent the living human cognitive interface between data, information and it's ultimate metamorphosis into knowledge. Despite the fact the KWs will serve the commander, their values could permeate the entire military organization. The KWs could ensure that their organizations would remain "open air" knowledge markets.

Leveling the Playing Field

Decision-making is being pushed down to lower levels within military organizations, often bypassing senior level hierarchies. However, information hoarding and coveting will continually impede effective decision-making. Therefore, opening up all channels of communication becomes paramount for the U.S. to remain the world's premier military force. Change in our military's cultural mindset is required of our senior leaders to allow access of all military personnel to understand the "big" picture, game plans and future of the organization, irresepective of position. A new level of trust needs to be established in the military organization--trust in personnel and that they will not abuse this privilege of increased information access. However, safeguards must be in place, such as punishment/penalties, for those who breach this trust. Trust from military personnel needs to be present--trust that the organization will provide the necessary tools and training to achieve designated goals. This

change must be filtered down from the top in order for the rest of the organization to take notice, adapt and be assimilated.

This chapter has proposed a wide range of measurement tools that could be used to evaluate all potential candidates for KW Programs. Due to the existence of a vast array of commercially available evaluation tools, we have therefore offered only a representative sample. Our proposed assessments have included measurements of both analytic and practical intelligence. However, we have proposed that the evaluation of an individual's successful intelligence is warranted. Because successful intelligence may prove to be a more valuable indicator and predictor of successful people, we have given stronger attention to this concept. We recognize that not all individuals test well, but we also acknowledge that these tools should not be "written off." We have taken the "leap of faith" to propose that the determination of one's successful intelligence is paramount, to discover and highlight one's strenghs rather than focus on one's weaknesses.

The following diagram offers a proposed accession model for the KW candidate. This chapter has suggested measurement tools which could be used in the initial suitability testing/evaluation phase. We propose that the determination of KW candidates revolve around initial suitability testing, combined with appropriate operational experiences and personal interviews.

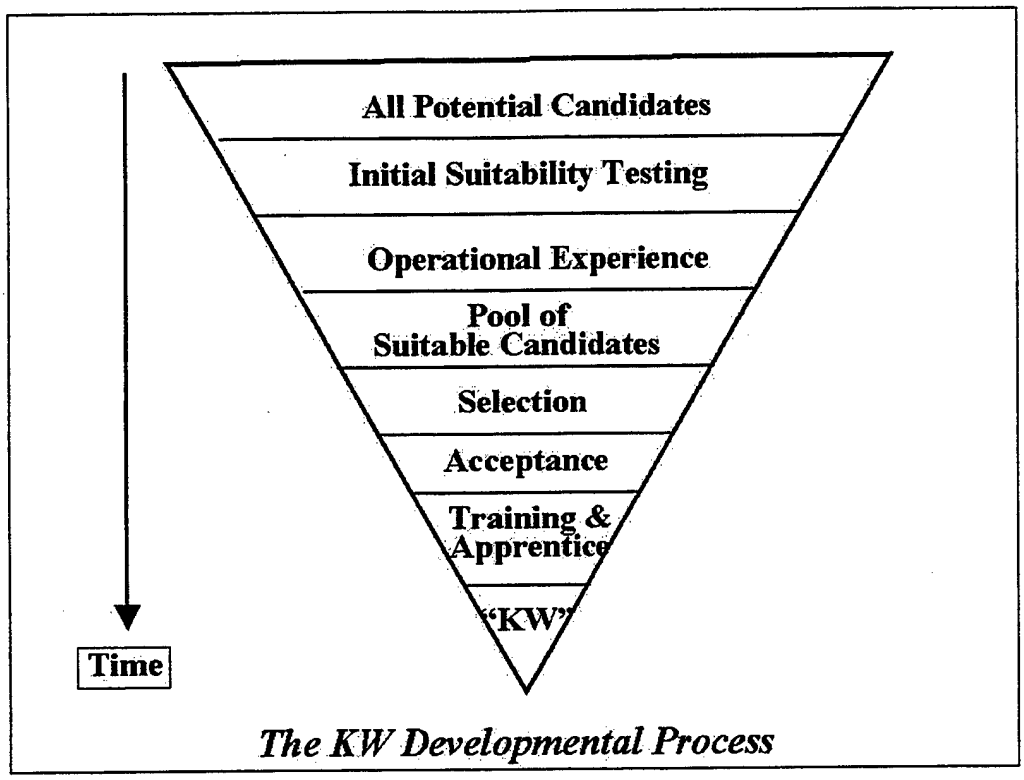

Figure 4-1. The KW Developmental Process

In the next chapter we provide the reader with a summary of our findings, as well as a KM Action Agenda with future recommendations on how the DoD can incorporate the discipline of KM within the services and joint operations.

CHAPTER FIVE

Conclusions and Action Agenda

"...ability to command will go to those who can convert information into actionable knowledge."[67]

Chapter Overview

This chapter will present our conclusions and recommendations for developing and implementing KM as a discipline within the DoD. Clearly the business literature and initial results from the emerging service-level KM programs point to the advantages provided by implementing KM practices and tools, all of which have the potential to significantly improve the knowledge sharing and operational effectiveness of organizations. As a result of the potential posed by successful KM programs, we now provide some general conclusions and recommendations, summarizing our research with a clear roadmap for military leaders seeking to build an agile and adaptive learning organization, one which is based upon a strong knowledge-based operational foundation.

Conclusions

- KM has greatly improved business operations and strategic decisionmaking. As a result of this success, there is a need for a set of basic KM operational principles to be mainstreamed into daily military tasks/activities.
- KM could and should be applied to facilitate strategic and operational decision making in the military to achieve the JV 2010 concept of information knowledge superiority and facilitating the JV2020 promise of "decision superiority."
- There is a need for a joint framework for implementing KM, while preserving any service-unique KM requirements and programs.
- The ideal KW candidate blends operational, technical and leadership talents. Existing service-level professional education programs can be adapted to train selected individuals to assume this catalytic role as "KWs."
- KM, the art of the KW, will eventually become standard practice within one military generation (approx. 15 years).

- We (the US military) can and should do this now within the context of the next QDR.

A Training Proposal for the KW

People are the linchpins of the KW Program. With the attributes listed previously in mind, the services must undertake the monumental task of recruiting and training the KWs of the 21st century. At the onset, we are proposing a phased-in recruiting, training and employment effort for the following reasons:

- Economy of Force. With the ongoing high Operations Tempo (OPSTEMPO) that all branches of the military are currently experiencing, a phased approach is more palatable in terms of both resources and overall focus.

- Promoting a gradual culture shift. A phased-in approach of the KW Program can help usher in a greater cultural acceptance level from both the established senior members of an organization and the "rank and file" military personnel. A gradual introduction and application of this capability can lead to a greater level of understanding on the part of the senior leadership. These senior leaders are better tuned to see the applicability and relevance of the KW program in terms of its effectiveness, vice someone's pedigree or personal crusade. This aspect often has been associated as an integral part of the military's culture (*i.e.,* a new way of thinking/a new strategy heralded by a prominent general or admiral).

- Allowing ample time for the establishment of a potent, "nuclear" KW force or a dedicated KW cadre at the major fighting formations of our military. This combination is of critical importance since a key part of the KW training is the reliance upon a senior KW to certify trainees, via the KW apprenticeship program, for future utilization.

In discussing the training proposal for KWs, we need to make the following key points:

- Title X. Recruitment, training, and development remain a service responsibility. This is to be accomplished via an agreed upon joint services standard, which will be prepared and signed off by all services. Having said that, we propose a joint employment concept for KWs. This is primarily based on the reality that nearly all engagements are joint in nature, with a potential for combined employment. For the moment, we would like to recommend that KWs should remain under U.S. control. Therefore, the fighting formation where a KW typically serves is joint in structure, function or daily employment.

- Accession. KWs are accessed at the O-3/O-4 level.

- "Train as you fight" (Doctrine). For our KW the realm of information is his true battleground and acquired knowledge is his victory. For effective KW training, we propose the following three-tiered approach -- joint KW training plan for all services:

First Tier: Institutional Training

This is the first phase or track of the overall KW program and it is especially important for those candidates with no previous military foundation. This first KW training phase is tailored to the needs of selected personnel based upon their operational experience and background. Following selection and acceptance, the KW candidate will undergo post-graduate education for technical training at a military (*e.g.*, NPS) or civilian institution. Following completion/degree attainment, then KW is then assigned a mentor. The mentor training phase encompasses three key components. KW candidates may spend up to one year in this phase which is jointly managed by the KW and the mentor. It comprises the following three training lanes:

- Self-Study Lane. Instructions and test materials are issued to the student in the form of DVDs, CDs, and web site access to a knowledgeable KW faculty in both joint and service communities. For the completion of this lane, the student is allotted office space, computer, and global online access, via either web or Local Area Network (LAN) connection capabilities. Throughout this lane, the mentor teaches, assists, and evaluates the student's progress. The designated mentor certifies successful completion of this phase. For KW faculty, there is no fixed site, nor any permanent members. Rather, it is a collection of serving KWs, academics, and a myriad of designated subject matter experts who are at the KW student's disposal, readily available or guide him or her.
- Orientation Lane. In this lane the student is placed on temporary duty status and, with his mentor's guidance, he undertakes a series of visits to key service, joint and DoD facilities, established as standard practice in the KW Program. These visits are beneficial to the student since they familiarize him with the latest relevant military structures and capabilities. During

these visits, the student receives briefings and is given tours. This lane is evaluated by the mentor, also who reviews the student's reports.

- Information Lane. In this last part of the student's institutional track, the student is exposed to US capabilities in terms of information gathering and dissemination in both civilian and military sectors. For economies of scale, we recommend that during this part the KW students who have completed all the earlier lanes converge to one central site and be assigned to a designated joint agency or organization that is responsible for arranging and synchronizing their training. Throughout this period, the student undergoes a series of tests to evaluate his assimilation and understanding. At this point also, the student increases his comprehension of the utility of the multitude of information system providers, processors, and interaction among themselves. In this lane, the student looks at the relevancy of particular information systems to the overall picture. The institutional track ends with a series of seminars and discussions, whereby students search for answers and pose questions to an assembly of mentors, selected academia, senior leaders, business executives, and subject matter experts. These events serve to crown the professional foundation of the future KW. With the completion of this phase, the KW is ready to proceed to undertake simultaneously the remaining two tracks.

Second Tier: Virtual University Track

At the core of the KW Program is the continuous engagement by the student, and later on by the KW, in a "virtual university" training model. As mentioned earlier, the KW pledges to be a career-long learner. He adheres to this track throughout both his training and tenure as a KW. In a sense, there is no graduation for this training phase. The core of the virtual university program consists of computer-generated scenarios which challenge the KW's information

processing and synthesizing capability. These scenarios offer multi-faceted situations, amidst a sea of chaotic factors and variables. This track consists of two parts: the initial training piece (*i.e.,* prior to the student's confirmation as a full-fledged KW) and a life-long quest for greater knowledge. This first part of the virtual university program exposes the student to a variety of scenarios. It is this part which also helps constitute the second element of the KW Training Program. The student interacts with the computer by seeking, analyzing, and synthesizing the information. He then formulates his knowledge of the situation and decides on potential courses of action. These courses of action are then evaluated in terms of applicability, relevancy, and effectiveness by both the computer and by the KW's mentor. In this endeavor, the student looks at the available information from a holistic approach. He is not restricted to a particular lane or discipline. Let us present the following vignette as an illustration:

> U.S. troops, along with some allied forces, have been committed to prevent a full-scale ethnic cleansing against a certain ethnic group by a ruthless regime in Africa. U.S. elements comprise the lion's share of both allied presence and scale of operations. The situation is tense, since the regime's forces are now viewing the allied intervention as a direct threat to their sovereignty and are prepared to wage a war of attrition, especially against the U.S. troops. Additionally, a large segment of the population belongs to the non-oppressed ethnic group and actively supports the regime.

Faced with this scenario, the KW student begins looking at all of the salient, relevant information factors.

> In this instance, he particularly focuses on the ravaged internal economic situation, especially the near absence of basic food staples and medicine required to meet the needs of both ethnic groups. He also studies the political and military postures of both friendly and enemy forces. However, in this scenario our KW student determines that it is the economic situation that is the country's center of gravity. These harsh shortages of food have even affected the regime's military forces that have now run out of supplies and are basically ransacking the entire countryside in search of food. The KW studies at great length the pertinent economic information and synthesizes it into a succinct and coherent knowledge package containing several courses of action. In this scenario, as the Joint Task Force's KW, he may recommend to the commander the following considerations:
> - The conduct of some "food for weapons" programs. Regime military forces would be disarmed in exchange for a one-week supply of food, possibly a case of MREs each.
> - The set-up of regular food distribution points in certain sectors where the two ethnic communities co-exist. This will undermine the influence of the regime as a long-term threat.
> - The dispatch of agricultural experts to aid the country in its farming needs.

The factors that a KW looks at in this exercise could be infinite and that there is no "right or wrong answer." Rather, there is an approximation instead. The student's goal is to at least be in the feasible arena: assisting in the formulation of reasoned options for the commander, while constantly striving for greater levels of knowledge, which lead to effective outcomes.

Third Tier: Apprenticeship

This track may last up to one year. This is basically an OJT opportunity for the student. At the completion of the apprenticeship, he is assigned to his mentor, a seasoned KW on a joint staff. He primarily serves as an assistant to the KW. He sits in on some of the meetings and is privy to the lion's share of information, except the privileged discussions or exchanges between the commander and his KW. That he will have to form on his own. During this assignment, his program is monitored and evaluated by his mentor, especially his interaction and level of efficiency with virtual reality scenarios. Only the KW student's mentor can certify the student's final completion of the apprenticeship program. Upon successful completion of the apprenticeship program, the student graduates and is assigned by his respective service to an operational KW role.

Although initially introduced at a Joint level headquarters by their respective services, in time we believe KWs will eventually populate all service headquarters elements. However, even this phase will be of short duration (approximately 15 years) due to the recommended exposure by all recruits and newly minted soldiers, sailors, marines and airmen to this joint, knowledge-based operational capability. In time, we perceive that the KW capability will become "second nature" to all of our military forces and will negate the current need to assign designated KWs. Eventually, and we believe within one generation, all military members will truly think of themselves as Knowledge Warriors and exhibit the inherent traits of all good KWs. With

dedicated senior-level support, ongoing and creative training initiatives, and a strong commitment from all the services, this goal can be achieved within one generation--we should develop the necessary roadmap and strive towards this end.

A KM Action Agenda

In time, we perceive that KM techniques will become "second nature" to all of our military forces. With dedicated senior-level support, ongoing and innovative training initiatives, plus a strong commitment from the services, this goal can be achieved within one generation. However, a clear roadmap is needed to mainstream KM and the KW concept within the DoD. The following section will provide the framework for a KM Action Agenda for the next QDR cycle:

- Recommend the Knowledge Warrior (KW) concept be explored more in-depth by the joint community, under the auspices of the National Defense University (NDU). NDU should undertake the academic setup and faculty monitoring of our proposed KW "virtual university," and orchestrate the joint portion of the KW education track. NDU should also develop and refine a customized KW Assessment Toolkit for initial screening and evaluation of KW candidates.

- Recommend the establishment of a JCS oversight process to immediately interact with NDU and the military services in regards to joint KW training standards, programs, and career development.

- Recommend the establishment of a Joint KM capability at Joint Forces Command (JFC). Recommend that JFC should explore methods of joint operational employment of the KW concept. JFC would provide leadership for KM warfighting applications, soliciting inputs from the CINCs. JFC would ultimately be responsible for determining how all DoD KW assets are organized, trained and equipped for joint commands and operations.

- Recommend the military services continue their Title 10 activities, engaging in their own respective studies of KM. However, we also recommend the services take steps to establish and man KM billets at the major fighting formations (CJTF-eligible commands). and ongoing development programs of joint KWs.

- Recommend that the KM concept be refined and exercised at the earliest opportunity within a major, joint operational wargame, (*i.e.*, the U.S. Navy's "Global" wargame and/or at the next Joint Forces Experiment/JEFX venue.)

We assert and believe that the use of KM within the military is not just a matter of whether the DoD should undertake more KM concepts, but more a matter of when, how, and to what degree these guiding principles should be mainstreamed within the operational forces. We also feel that the use of KM concepts can provide a powerful catalyst for change - generating the types of innovative processes, interactive learning, stronger team building, and improved organizational structures needed to meet the challenges of globalization and future warfare.

The cultural change process will take time and there are still many other questions and research studies that must be undertaken to further define KM and the KW concept for joint operations. Some of the important questions regarding KM which still remain to be answered include:

- How can we develop smart ways to integrate existing service-level IT/KM programs for a joint perspective?
- How do we design attractive compensation and incentive packages to encourage operations personnel to become KWs?
- How do we structure KW programs which include our highly-trained enlisted service members as a key component for force planning, utilizing the strong IT skills already inherent in our enlisted forces?

This follow-on KM research will be challenging, but could lead to new ideas and approaches about how we meet the challenges of the Information Age. This includes a larger look at whether services might one day require their own information corps or an entirely new joint information service.

KM is not simply an organizational concept for future study, but rather a mandate for cultural and organizational changes that we must undertake. As a catalyst for cultural change within the military, the KW concept can provide the necessary means to help us network our forces more efficiently; share our knowledge more interactively; and, significantly improve the

way we organize and employ our military forces — actions which can assist in ensuring our national security for future generations.

Endnotes

[1] Daniel Verton, "DIA Tackles Flow of Intelligence," Federal Computer Week, October 18, 1999.

[2] James O. Ellis, comments excerpted from a briefing on the Kosovo conflict titled "Full Dress Blue: A View from the Top."

[3] Carla D. Bass, "Building Castles on Sand," Airpower Journal, 28.

[4] Stuart E. Johnson and Martin C. Libicki, Dominant Battlespace Knowledge: The Winning Edge, 7.

[5] David Alberts, John Garstka, and Frederick Stein, Network Centric Warfare, 1.

[6] Thomas L. Friedman, The Lexus and the Olive Tree, 175.

[7] Extracted from Arthur K. Cebrowski, "Network-Centric Warfare: An Emerging Military Response to the Information Age," speech presented to the 1999 Command and Control Research and Technology Symposium, June 29, 1999.

[8] Arthur K. Cebrowski, "Network Centric Warfare -- Its Origin and future," Naval Institute Proceedings, 35.

[9] This quote attributable to the KW team.

[10] Information extracted from K. Harris, Knowledge Management: Why? Why Not?, Gartner Group, Inc. Research Note SPA-09-3890, October 1999.

[11] Richard E. Neustadt and Ernest R. May, Thinking in Time, xvii.

[12] Joint Chiefs of Staff, Joint Vision 2010, 16.

[13] JV2010, 16. Italics author.

[14] Joint Chiefs of Staff, Joint Vision 2020 (Draft).

[15] JV2020, 2.

[16] JV2020, 17.

[17] Arthur K. Cebrowski, Statement before the House Armed Services Committee Subcommittees on Research and Development and Procurement hearing on Network-Centric Warfare and Information Superiority, February 23, 1999.

[18] Richard L. Nolan and David C. Croson, Creative Destruction: A Six-Stage Process for Transforming the Organization, 16-17.

[19] Alberts, Garstka and Stein, 29.

[20] Carl H. Builder, "The American Enterprise in the Information Age," from Zalmay Khalilzad and John P. White, The Changing Role of Information in Warfare, 19-20.

[21] Alberts, Garstka and Stein, 25.

[22] Builder, 20.

[23] Moore's Law holds that computing power will double and decrease in cost every 18 months.

[24] Information extracted from Harvard Business School, The Transformation of IBM, Case Study 9-391-073.

[25] Information extracted from Harvard Business School, IBM Corporation: Turnaround, 1991-1995, Case Study 9-600-098.

[26] Stephen P. Bradley and Richard L. Nolan, Sense and Respond, 8.

[27] For comparison purposes, here's how Cisco and their closest competitor, Lucent Technologies, stack up (info as of 8/99):

Category	Cisco	Lucent
Revenues	$12B	$30B
Profit	$2B	$1B
Employees	15,000	141,600
Revenue/Employee	$800K	$211K
Market Value	$221B	$206B

[28] Information extracted from Harvard Business School, Cisco Systems, Inc.: Implementing the ERP, Case Study 9-699-022.

[29] Builder, 21.

[30] Clayton M. Christensen, The Innovator's Dilemma, xiii-xvii.

[31] Cebrowski, 34-35.

[32] Friedman, 188.

[33] Friedman, 188.

[34] As cited in Peter Schwartz, The Art of the Long View, 187.
[35] Alberts, Garstka, and Stein, 229-230.

[36] This diagram derived from a classroom illustration provided by Dr. Jack Rockart, MIT Sloan School of Management, for the Proseminar on Information Technology and Business Transformation (MIT 15.598).

[37] The DoN also includes the Marine Corps.

[38] Information in this section is drawn from a briefing provided by Ms. Alex Bennet, Deputy CIO for Enterprise Integration and DoNCIO's web site < http://www.doncio.navy.mil.

[39] Information in this section is derived form the NWDC's most recent draft of the Capstone Navy Operational Concept, Network Centric Operations.

[40] Naval War College, <http://www.nwc.navy.mil/wgd (you must be a registered user).

[41] Naval Postgraduate School, <http://www.nps.navy.mil.

[42] HQ Department of the Army, "Army Knowledge Online (AKO) Strategic Plan, Version 2.0," 11 December 1998, ES-1 - ES-5.

[43] AKO, ES-1 – ES-5.

[44] AKO, ES-1 – ES-5.

[45] AKO, ES-1 – ES-5.

[46] Information in this section is derived from the "Army Knowledge Online (AKO) Strategic Plan, Version 2.0," 11 December 1998, accessible from the Army's primary KM web site: http://www.ako.army.mil

[47] Randy Adkins, Phone interview, 21 April 2000.

[48] Air Force, "Air Force Knowledge Management Information Page," < http://AFKM.wpafb.af.mil

[49] Information in this section is derived from "An Expeditionary Force," Air Force Magazine, April 2000, pp. 34-41.

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[51] Owen Jacobs, Regarding "Executive Assessment at ICAF." E-mail to author, 19 April 2000.

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[53] Robert Sternberg, *Successful Intelligence, How Practical and Creative Intelligence Determines Success In Life* (New York: Simon & Schuster, 1996) 98, 230-231.
[54] Paul Kline, *Handbook of Psychological Testing,* 2nd Edition (London: Routledge, 2000) 447-453.

[55] Kline. 453-456.

[56] ---. *Handbook of Psychological Testing* 2nd Edition (London: Routledge, 2000) 514.

[57] William C. Jeffries, *True To Type* (Virginia Beach: Hampton Roads Pub., 1990) 82.

[58] Isabel B. Myers and Peter B. Myers, *Gifts Differing, Understanding Personality Type* (Palo Alto :Davies-Black Publishing , 1995) xii.

[59] Jacobs. 14-19. The rest of this section outlining the Gordon Personal Profile-Inventory was taken from this work.

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[61] Jacobs. 4, 26-30.

[62] Sternberg. 127-128.

[63] Sternberg. 12.

[64] Sternberg. 12.

[65] Sternberg. 150-152. Underlines and bolds, mine.

[66] Thomas H. Davenport and Laurence Prusak, *Working Knowledge* (Boston: Harvard Business School Press, 1998) 30-34.

[67] Robert S. Wood, former Dean, College of Naval Warfare Studies (attributable).

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